

ISSN 2056-4856 (Print)

ISSN 2056-4864 (Online)

# **WATERLAT NETWORK WORKING PAPERS**

**Research Projects Series SPIDES**

**DESAFIO Project**



**Working Paper Vol. 2, N° 16**

**Democratisation of Water and Sanitation Governance  
by Means of Socio-Technical Innovation**

**Final Project Reports**

**Newcastle upon Tyne, UK**

**December 2015**

Cover picture: Public meeting of the Participatory Budgeting programme during the implementation of the Integrated Sanitation model covered in one of DESAFIO's case studies, Recife, 2009.

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Backcover picture: Members of DESAFIO visiting the site of one of the case studies in Mondomo, Valle del Cauca, Colombia, August 2014.

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# **WATERLAT-GOBACIT NETWORK WORKING PAPERS**

## **Research Projects Series SPIDES DESAFIO Project –**

### **Working Paper Vol. 2 N° 16**

#### **Democratisation of Water and Sanitation Governance by Means of Socio-Technical Innovation**

#### **Final Project Reports**

**José Esteban Castro (Ed.)**  
**Newcastle University, United Kingdom**

**Newcastle upon Tyne**

**December 2015**

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## **Democratisation of Water and Sanitation Governance by Means of Socio-Technical Innovation**

### **Final Project Reports**

#### **Keywords**

Water and sanitation, socio-technical innovations, inequality, vulnerability, democratization, rural sanitation, community participation, citizenship, water politics

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## **Presentation of the SPIDES Series and the Working Paper**

SPIDES stands for Research Projects Series (SPI), DESAFIO Project, for its acronym in Portuguese and Spanish. WATERLAT-GOBACIT is a network dedicated to research, teaching and practical interventions connected with the politics and management of water and water-related activities. The DESAFIO Project ([www.desafioglobal.org](http://www.desafioglobal.org)) was developed by researchers of WATERLAT-GOBACIT's Thematic Area 3, dedicated to the Urban Water Cycle and Essential Public Services, jointly with invited partners.

DESAFIO had a lifetime of 30 months, from 1 February 2013 to 31 July 2015. It was funded by the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement N° 320303. The information contained in the documents published in the SPIDES Series reflects only the views of the researchers, and the European Union is not liable for any use that may be made of the information contained therein.

DESAFIO is the acronym for “Democratisation of Water and Sanitation Governance by Means of Socio-Technical Innovations”, the project's full title. DESAFIO literally means “challenge” in both Portuguese and Spanish, the two main working languages of the project owing to its focus on Argentina, Brazil, and Colombia. This was a fitting acronym for the project, as it concerned what still now after the end of the Millennium Development Goals in 2015, constitutes one of the most difficult challenges facing developing regions: eradicating structural social inequality in the access to essential water and sanitation services. In other words, as the full title states, the project was about the democratization of the politics, management, and access to essential public services, with an empirical focus on water and sanitation services.

The project focused on the study of eight experiences identified in Brazil, Argentina and Colombia, which targeted the deficit of essential services in vulnerable communities through the design and implementation of socio-technical innovations. These experiences had in common an approach that articulated technological development with a clear concern for some aspects of the democratization process, for instance involving community members in one or more stages of the design, implementation, and long-term maintenance of the systems. Bolder initiatives extended the involvement of common citizens to the design of public policy and introducing mechanisms of radical democracy to empower citizens-users to monitor the performance of the government, the service providers, and other relevant power holders. Latin America has been an experimental field for this kind of developments, and the project chose a range of experiences in order to cover a variety of socio-political, cultural, and policy-institutional contexts, in addition to a wide selection of settings including urban and rural communities in the three countries. DESAFIO placed these experiences of socio-technical innovation at the heart of the study: “the main tenet of [the project] is that achieving the development goals set by the international community [...] crucially depends on harnessing existing and developing new appropriate and innovative socio-technical solutions for the provision of safe water and sanitation services” (Castro, 2013: 3).

This way of framing the research problem led to the formulation of specific questions that guided the study:

How can we harness existing and develop new socio-technical innovations in order to change policies, to develop strategies and practical interventions, and to enhance policy learning for tackling unacceptable inequalities and injustice in the access to essential water and sanitation? What conditions, factors and processes facilitate the emergence of socio-technical innovations in this sector? What are the critical requirements to make successful socio-technical innovations sustainable and replicable? What are the obstacles to their sustainability and replication? (Castro, 2013: 3).

In order to respond to these research questions, DESAFIO adopted a comparative, interdisciplinary approach grounded in the social sciences and involving the participation of technical disciplines, particularly sanitary engineering, epidemiology, health, and ecology. It was also transdisciplinary, as the research team included practitioners from public sector and civil society institutions, and was developed in close co-operation with community organizations and other relevant actors. We present a more detailed discussion of the methodological approach employed by the project in another Working Paper of the SPIDES Series (Castro, 2015).

This Working Paper presents an edited version of three research papers corresponding to DESAFIO's Final Project Reports. In addition to the three articles presented in this Working Paper, the reader may benefit from complementary information that we have made available online, including video records of public presentations made by the researchers in a number of events organized by DESAFIO. These include the First Project Conference, which took place in Recife on 25 February 2013 (<http://desafioglobal.org/meetings/open-meetings/conference/>), the Final Project Conference that took place in Rio de Janeiro on 27-28 July 2015 (<http://desafioglobal.org/meetings/open-meetings/second-international-conference/>), and a special dissemination seminar that took place in the city of Brasilia on 9 September 2015 (<http://desafioglobal.org/meetings/open-meetings/post-project-meetings/seminar-in-brasilia-9-10-september-2015/day-1-a-seminar-for-research-and-debate-desafio-project-9-september-2015/>). The presentations of the First Conference were published in the SPIDES Series of Working Papers (CASTRO et. al, 2013, available at: <http://waterlat.org/WPapers/WATERLAT%20Working%20Paper%20SPIDES%201.pdf>).

Article 1 presents a synthesis of project results, organized in relation to the DESAFIO's original research questions. Article 2 contains a number of policy guidelines elaborated on the basis of the project results as recommendations for national and international policy makers, practitioners, and other actors involved in the politics and management of essential water and sanitation services. Finally, Article 3 identifies a number of knowledge gaps that offer opportunities for further research on the challenges facing the democratization of water politics and management, particularly in relation to vulnerable communities.



The Working Paper constitutes work in progress that may be revised, and may be further developed and later published in journals or as book chapters. We are pleased to present this work to the interested public.

Jose Esteban Castro  
Project Co-ordinator

Newcastle upon Tyne, December 2015

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## **List of Acronyms**

CAF	Development Andean Corporation
D	Deliverables
DESAFIO	Democratisation of Water and Sanitation Governance by Means of Socio-Technical Innovation
EC	European Commission
ECLAC	UN-Economic Commission for Latin America and the Caribbean
IDB	Inter-American Development Bank
IFIs	International Financial Institutions
LA&C	Latin America and the Caribbean
MDGs	Millennium Development Goals
NGO	Non Governmental Organization
RJMA	Rio de Janeiro Metropolitan Area
SDGIs	Sustainable Development Goal Indicators
TISA	Trade in Services Agreement
UN	United Nations
UNR	National University of Rosario, Argentina
UNIVALLE	University of the Valley, Colombia
WHO	World Health Organization
WP	Work Packages
WSS	Water and sanitation services
WTO	World Trade Organization

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### **Socio-technical solutions for the provision of safe WSS in vulnerable communities: a synthesis**

**Work Package 6 Report  
(Deliverable 6.1)**

#### **Author**

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Newcastle upon Tyne, 31 July 2015

DESAFIO is a Collaborative Project (CP-FP-SICA) funded by the European Union's  
Seventh Framework Cooperation Programme. Grant Agreement N° 320303.



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## **Article 1**

# **Socio-technical solutions for the provision of safe water and sanitation services in vulnerable communities: a synthesis**

Prof. Jose Esteban Castro  
Newcastle University

## **Introduction**

This report provides a summary of key project results, focusing on the findings that provided relevant evidence to respond the project's research questions along the lines of the indicators of progress beyond the state of the art set in the original project proposal (see Table Nº 2). Details of the studies, particularly for the techno-infrastructure dimension of the socio-technical innovations studied, are treated in more depth in the individual case-study reports (Britto et. al, 2015; Brown, 2015; Castro and Ferreira, 2015a,b; de Pádua et al., 2015; Freitas et. al., 2015; Passos et. al., 2015; Peña et. al., 2015, a,b; Portapila et. al, 2015) and in the cross-comparative report (Pinto et. al., 2015). For a fuller picture of the results, this document should be read in conjunction with the two cross-comparative reports (Pinto et. al., 2015; Castro, 2015b).

The first section discusses the results in the light of the project's research problem and provides the framework for the synthetic analysis of results organized around the project's research questions. Section 2 presents an overview of the socio-technical innovations covered in the ten case study reports. In Section 3, we examine the political character of the socio-technical innovations, in line with the project's main objective to study innovations aimed at the democratization of the politics of essential water and sanitation services (WSS) to solve the deficit of these services affecting vulnerable communities. Sections 4-6 present the key findings regarding how socio-technical innovations emerge, and about the factors and process that help to explain the success and failure in the long-term term sustainability and replicability of the innovations. The Conclusions provide a summary of the main findings in relation to the indicators of progress beyond the state of the art set in the original project proposal.

## **1. The research problem and questions**

As explained in the original project proposal (DESAFIO, 2013: 3), DESAFIO literally means “challenge” in both Portuguese and Spanish, the two main working languages of the project owing to its focus on Argentina, Brazil, and Colombia. This was a fitting name for our project, as it concerns what still now after the end of the Millennium Development Goals (MDGs) in 2015, constitutes one of the most difficult challenges facing Latin America and the Caribbean (LA&C) and most other developing regions: eradicating structural social inequality in the access to essential WSS. In other words, as the full title states, **our project was about the democratization process in the field of essential public services**, with an empirical focus on WSS.

Effectively, despite the fact that in many regards the MDGs were a timid attempt to decrease inequality in the access to WSS, compared with the more radical goals of the 1980s, we failed to achieve the real target even if nominally the MDGs have been met. In the 1980s, the UN International Drinking Water and Sanitation Decade had the goal of bringing 40 litres of safe drinking water to every human being in the planet by 1990 (UN, 1980). This ambitious and universalistic goal was not achieved, as in 1990 there were 1.1 billion people, 17% of the world population, without safe drinking water, and 40% lacked basic sanitation facilities. Then, the MDGs set in 2000-2002 aimed at halving the proportion of the unserved population by 2015 (UN, 2000, 2002), a tacit admission that universalization of essential WSS was not to be achieved for at least two more decades. In this sense, the MDGs were timid, conservative, and even mean compared with the goals of the 1980s. Yet, we failed to achieve them too.

For some, admitting that we failed to achieve the MDGs may sound unacceptable, a too radical judgement some would say, and they may point to official figures showing that LA&C would have met the MDG targets. However, the official figures show that 11 LA&C countries did not meet the target of halving the proportion of the population without access to an “improved water source”, while 19 countries of the region failed to meet the target for sanitation consisting in halving the proportion of the population lacking access to “improved sanitation facilities” (ECLAC, 2015: 65). In rural areas, the situation is much direr, and in countries like Bolivia, Colombia, Ecuador, Haiti, Nicaragua, Peru, and Venezuela, 80% of the rural population continue to “lack sustainable access to drinking water” (ECLAC, 2015: 65). A recent report from the Inter-American Development Bank (IDB) suggests that between 30% and 40% of rural water systems in the LA&C are out of working order, while others suffer chronic problems of water quality, intermittence, and quantity of water delivered (Ducci, 2015). Although the situation for basic sanitation has improved since 1990, still only 64% of the LA&C population in rural areas has access to “improved sanitation facilities” in 2015. The figure is below between 60% and 80% in El Salvador, Guatemala, Nicaragua, Panama, Peru, Saint Vincent and the Grenadines, and Suriname, and less than 50% in Bolivia, Guatemala, and Haiti (ECLAC, 2015: 65). The IDB report cited above estimates that 12% of the LAC population still practices open defecation in 2015, ranging from 11% in Honduras and Ecuador, 13% in Brazil, 14% in Colombia and Nicaragua, to 35% in Haiti and 46% in Bolivia (Ducci, 2015).

Even these figures must be read with caution, as we are not discussing here the implications of the indicators used for the MDGs, “improved water sources” and “improved sanitation facilities”, which have been the subject of long debates. The inadequacy of these indicators has been already accepted as the evidence shows that not all “improved” water sources actually provide drinking water that is safe for human consumption (WHO, 2010: 9), because “water from improved sources is not necessarily free from contamination” (WHO-UNICEF, 2014: 42). As a result, in the ongoing discussions about the post-2015 Sustainable Development Goal Indicators (SDGIs) a new definition has been put forward: “safely managed drinking water”, which means that “services reliably deliver water that is sufficient to meet domestic needs and does not represent a significant risk to health” (WHO-UNICEF, 2014: 41). In short, if we consider the quality of the water available to people, the official MDG figures would be much more modest and the reality that we have not truly achieved the real target becomes apparent.

Moreover, one of the latest reports about the MDGs argues that the advances made towards meeting the goals in 2015 have often reproduced or even generated new inequalities in the access to WSS:

[I]t is usually the poor and otherwise excluded and marginalized populations who tend to have least access to improved drinking water supplies and sanitation. **Interventions that do not have an equity focus may exacerbate inequality by failing to reach the most disadvantaged subgroups.** Closing these gaps requires explicit consideration of those who are being left behind. [...] there are multiple dimensions of inequality, which can overlap, combine or reinforce one another. Without specific attention to marginalized or vulnerable groups, **it is possible to see national averages improve while within-country inequality increases** (WHO-UNICEF, 2014: 38; our emphasis).

A very important point in this statement relates to evidence presented earlier by the authors in the same report showing that in some countries that met the MDGs **intra-national inequalities increased because the wealthier tend to benefit first.**

In this connection, unfortunately it can be said that in many ways the research problem that was the object of DESAFIO starting in early 2013, remains largely unchanged. As stated in our original proposal:

We argue that these deficiencies [in relation to WSS] are caused neither by unfortunate environmental constraints nor by a shortage of scientific and technical knowledge or by the unavailability of technological solutions, even in the poorest countries. [...] **What we confront are protracted structural social inequalities historically developed and reproduced along the lines of age, class, ethnicity, gender, and other power-based social divisions.** [...] the main reasons for the predicted failure in meeting the MDGs are derived from the deficiencies in the

exercise of democratic governance and substantive citizenship [...] too often “citizen participation” in policy programmes means “willingness” to accept decisions already taken by power holders and technical experts with little or no consultation [...] while the users themselves are often reduced to the role of passive beneficiaries, providers of labour and resources, or mere clients of profit-oriented WSS. For instance, decisions about how WSS should be financed and organized (e.g. should these be provided as a public good and a social right or should rather be considered to be commodities to be delivered commercially by profit-oriented private or public operators?) have been time and again imposed on the population, often with disregard for the fact that large citizen majorities oppose the initiatives, which has triggered endless conflicts in many countries, including those considered in this proposal (DESAFIO, 2013: 3, 11-12).

On this basis, we formulated our research problem taking into account a number of experiences that we identified in Brazil, Argentina and Colombia, which targeted the deficit of WSS in vulnerable communities through the **design and implementation of socio-technical innovations**. These experiences had in common an approach that articulated technological development with a clear concern for some aspects of the **democratization process**, for instance involving community members in one or more stages of the design, implementation, and long-term maintenance of the systems. Bolder initiatives extended the involvement of common citizens to the design of public policy and **introducing mechanisms of radical democracy** to empower citizens-users to monitor the performance of the government, the WSS providers, and other relevant power holders. LA&C has been an experimental field for this kind of developments, and we chose a range of experiences in order to cover a variety of socio-political, cultural, and policy-institutional contexts, in addition to a wide selection of settings including urban and rural communities in the three countries.

Therefore, we placed these experiences of socio-technical innovation at the heart of our project: “the main tenet of this proposal is that achieving the development goals set by the international community [...] crucially depends on **harnessing existing and developing new appropriate and innovative socio-technical solutions** for the provision of safe WSS (DESAFIO, 2013: 3, **our emphasis**). This way of framing our research problem led us to formulate specific questions that guided our research work:

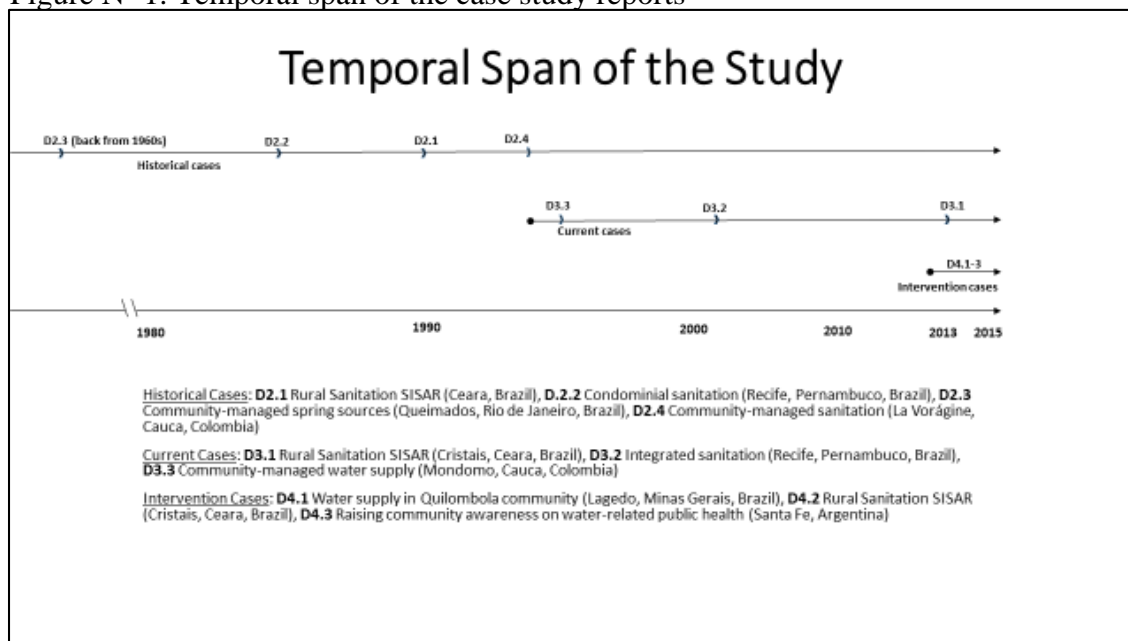
How can we harness existing and develop new socio-technical innovations in order to **change policies**, to **develop strategies and practical interventions**, and to **enhance policy learning for tackling unacceptable inequalities and injustice** in the access to essential WSS? What **conditions, factors and processes facilitate the emergence** of socio-technical innovations in this sector? What are the **critical requirements** to make successful socio-technical innovations **sustainable and replicable**? What are the **obstacles to their sustainability and replication**? (DESAFIO, 2013: 3, **our emphasis**.)



## **2. DESAFIO's case studies and the democratization of WSS**

In total, we developed ten case study reports covering seven experiences of socio-technical innovation in the three countries involved in the research, Argentina, Brazil, and Colombia (Britto et. al, 2015; Brown., 2015; Castro and Ferreira, 2015a,b; de Pádua et al., 2015; Freitas et. al., 2015; Passos et. al., 2015; Peña et. al., 2015, a,b; Portapila et. al, 2015). One of these experiences was covered by three research reports that addressed different angles of the innovation: the case of the Integrated Rural Sanitation System (SISAR) implemented in the state of Ceara, Brazil. We dedicated an individual page to each case study report in DESAFIO's web site. The experiences span over several decades and include a wide range of situations, from community-organized and managed spring water sources in the Rio de Janeiro Metropolitan Area (RJMA) dating back at least to the 1960s, to the diagnosis of water quality and the development of a water filtration system through participative activities jointly with members of a remote small rural community in the state of Minas Gerais, Brazil. We organized the case study work in three Work Packages (WP) to differentiate three categories reflecting different degrees of maturity of the experiences studied: WP2) "historical cases", roughly with at least 20 years of existence, WP3) "current cases", that had been implemented within the previous decade, and WP4) newly developed "interventions" that took place during the period of the research (2013-2015). Figure Nº 1 illustrates the temporal distribution of our ten case study reports or Project Deliverables (D).

Figure Nº 1. Temporal span of the case study reports



Source: Castro (2015b), p. 4.

Although the experiences studied go back at least to the 1960s, in practice our research was centred on the period beginning in the 1980s, when the bulk of our cases

are concentrated. Table N° 1 provides synthetic information about each of the case study reports, indicating Work Package and Deliverable number, and providing a link to the web page of each case study report (clickable in each WP of the left column).

**Table N° 1. The case study reports**

<b>Work Package and Deliverable</b>	<b>Socio-technical innovation</b>	<b>Location</b>
<b>Historical Case Study Reports</b>		
WP2.1	Integrated Rural Sanitation System (SISAR)	State of Ceara, Brazil
WP2.2	Condominial Sanitation System	Mustardinha community, Recife, Brazil
WP2.3	Community-managed spring water sources ( <i>minas de água</i> )	Queimados Municipality, Rio de Janeiro Metropolitan Area, Brazil
WP2.4	Community-managed integrated WSS system with multi-stage filtration	La Vorágine community, Cali, Colombia
<b>Current Case Study Reports</b>		
WP3.1	Integrated Rural Sanitation System (SISAR)	Arataca and Andreza communities, Fortaleza Metropolitan Region, Ceara, Brazil
WP3.2	Integrated Sanitation System	Mustardinha community, Recife, Brazil
WP3.3	Community-managed water supply system with ecological multi-stage filtration	Mondomo community, Santander de Quilichao, Cauca, Colombia
<b>Intervention Case Study Reports</b>		
WP4.1	Participative development of drinking water filtration system	Lagedo quilombola community, Sao Francisco, Minas Gerais, Brazil
WP4.2	Integrated Rural Sanitation System (SISAR)	Cristais community, Fortaleza Metropolitan Region, Ceara, Brazil
WP4.3	Participative assessment of water quality	Carcaraña, Coronda, La Chispa & San Francisco, Cañada de Gomez, Santa Fe, Argentina

We have addressed elsewhere in detail different aspects of the ten case study reports, including the systematic comparison of results (Pinto et. al, 2015; Castro, 2015). Also, for a more detailed description of the innovations and their implementation the

reader should check the individual case study reports (Britto et. al, 2015; Brown., 2015; Castro and Ferreira, 2015a,b; de Pádua et al., 2015; Freitas et. al., 2015; Passos et. al., 2015; Peña et. al., 2015, a,b; Portapila et. al, 2015).

In the following sections, we present a synthesis of results focusing on DESAFIO's original research questions. Next, we centre attention on the political character of the socio-technical innovations studied in the project, as the crucial objective of our research was to better understand how these innovations can contribute to democratize the politics of WSS.

### **3. Socio-technical innovations to democratize the politics of WSS**

Drawing on our central research objective described above, DESAFIO's first and more general research question asked

*How can we harness existing and develop new socio-technical innovations in order to change policies, to develop strategies and practical interventions, and to enhance policy learning for tackling unacceptable inequalities and injustice in the access to essential WSS?*

In this regard, the innovations studied are characterized by the articulation of mostly pre-existing technologies in new socio-political and policy-institutional arrangements and configurations. In all cases, the objective of the innovations was to contribute not only to tackle the deficit in the access to quality WSS in vulnerable communities, but to do so by involving members of these communities in the process. Implicitly, and often explicitly, all these innovations are **political in character**, as their introduction has the potential to **transform existing structural inequalities** in the activities of design, implementation, management, and monitoring of public policy and implementation in the field of essential WSS. Several of these innovations were **explicitly developed as political instruments** to transform the reality of vulnerable communities, such as in the cases of the Condominial and Integrated Sanitation systems implemented in Recife, Brazil (Castro and Ferreira, 2015a,b). All the innovations studied are also "political" in a more general sense, as **their emergence did not happen in a social and political vacuum** and were rather highly influenced by the social and political context (Castro, 2015b), as briefly discussed later. We summarize below some of the clearest examples of how the socio-technical innovations studied in DESAFIO contribute to the democratization of the politics of WSS.

Beyond the explicit or implicit political objectives of the innovations or the influence of the social and political context in their emergence, all the innovations **have clear political effects on the communities** where the systems were implemented. We found evidence of empowerment of local communities, which in some cases were able to develop sustainable levels of **autonomy from power holders** and gain access to

**dignified living conditions** with safe and affordable WSS. A notorious example is the rural community of Mondomo in Colombia, the object of WP3.3 (Peña et. al, 2015b). In this case, after the local water system was destroyed by an earthquake in 1994, a new system was built with the leadership of the regional public university, DESAFIO's partner UNIVALLE, mostly with public funding, additional financial and technical support from local private actors and international donors, and meaningful community involvement. The significant aspect of this experience is that the construction of the new system did not follow the conventional top-down approach characteristic of technocentric interventions. The innovative character of this case is that it brought together a simple, affordable, locally-sensitive and effective water treatment eco-technology with participative activities that involved the local community in ways that allowed them to **fully appropriate the technical knowledge to understand, operate, and maintain the system over time**. There is no need to romanticise the experience, and in fact, the study also highlighted pitfalls, threats, and challenges facing community-managed WSS like Mondomo's. However, the study showed the potential of these innovations to **foster the democratization process in vulnerable rural communities**, which as mentioned earlier are the most deprived and marginalized social sector in LA&C in relation to WSS and other essential services.

Another important example addressing the situation of unserved rural communities that we covered in our study is the Integrated Rural Sanitation System (SISAR) implemented in Ceara, Brazil (Brown, 2015; Freitas et. al, 2015; Passos et. al., 2015; Cortez, 2015; Alves, 2015). SISAR was developed as an initiative to **tackle the lack of drinking water in rural areas** of Ceara, a Brazilian state located in the semi-arid region of the country where rural communities tend to be small and scattered over long distances. The initiative was triggered during the 1980s by a cooperation agreement between the state government of Ceara and international donors. SISAR is a not-for-profit non-governmental organization (NGO), which taps on a **long tradition of associativism characterizing the local culture**, and was designed to provide support to rural community associations that take charge of running their own WSS systems. Initially the objective was that SISAR would be **financially self-sufficient**, but over time it became clear that **it needs strong public sector support to be sustainable**, and the provincial public utility CAGECE, one of DESAFIO's research partners, created a special management unit to support the operations. This has been a very successful experience, and currently there exist eight SISAR units in the state of Ceará, providing support to 759 local water supply systems in 137 municipalities, serving over 430 thousand people (Alves, 2015). Moreover, the system has been identified by international donors and financial institutions (IFIs) as a model to be **replicated in other countries**, a process that has already started. Like in the previous case, we do not romanticise the experience, and our case study reports highlight important pitfalls and potential dangers that need to be addressed in the functioning of SISAR. However, this is undoubtedly a socio-technical innovation that has already demonstrated **the feasibility of solving the lack of access to drinking water affecting rural communities** in LA&C, and its potential to make a **material contribution to the democratization process** in the WSS sector.

The community-managed multi-stage filtration system implemented in Mondomo or the SISAR system discussed above **were not explicitly political projects**, and often have been perceived and presented as “apolitical” by the community and other actors who

strive to protect the project from the intervention of external political actors, and particularly from the influence of electoral politics. However, other experiences studied in DESAFIO were **explicitly designed as political projects** and its implementation was made possible by the determination of political actors, and their success in electoral politics. The clearest examples in our project are the cases of the Condominial Sanitation System studied by WP2.2, and the Integrated Sanitation System studied by WP3.2, both of them implemented in Recife, Brazil. In the case of Condominial Sanitation, the designer of the system, Eng. Jose Carlos Melo, explicitly defined it as a “political project” (Melo, 2014, 2015). It was political firstly because it tried to **subvert the technological status quo in WSS** based in large-scale, centralized infrastructures, by introducing low-cost, small-scale, interconnected decentralized sewerage systems. Secondly, **it was a political decision to design a system to tackle the lack of sanitation services in vulnerable communities** located in informal urban areas, which were left unserved by the conventional networked WSS that only provide services in regularized urban areas. Thirdly, the Condominial project **involves the participation of the users**, to the point that the infrastructure cannot be introduced in their neighbourhood without the explicit consent of the communities. Once the decision is taken, the participation is extended to the provision of materials, financial support, and labour during the construction and later for the management and long-term maintenance of the system. Fourthly, at least in Recife, the implementation was made possible because Eng. Melo became the Vice-Mayor of the city in the 1980s and the Condominial System was adopted as **an official municipal public policy to tackle the deficit of sewerage collection and treatment in vulnerable areas**. Like in the previous case, there is no need to romanticise the Condominial Sanitation System, and in fact the experience in Recife studied in our project was mostly a failure (however, the system has been highly successful and has been replicated in Brazil and in a large number of countries in several continents). The important point for our analysis here is that the experience illustrates the fundamentally **political nature of socio-technical innovations aimed at solving the situation of vulnerable communities**.

The other intervention introduced in Recife, the Integrated Sanitation System implemented since 2001 and studied by WP3.2, was perhaps the most explicitly political socio-technical innovation addressed in DESAFIO. In this case, the political character of the intervention included some of the elements highlighted in the experience of the Condominial System, but went beyond it by introducing **elements of radical democracy in all stages of the design and implementation of municipal public policy for the whole city**, including the provision of WSS for vulnerable communities. The Integrated Sanitation system was also predicated on **a critique of both** the mainstream conventional WSS that excludes vulnerable communities located in irregular urban areas and of the Condominial Sanitation system as implemented in Recife. The premise was that there should be a single policy and a single system for the whole city, rich and poor alike. Why should poor vulnerable communities “participate” by providing funding, materials and labour, including the long-term maintenance of their domestic sewerage network, while the urban middle classes are served by the public utility and **are not required to participate** to have access to WSS? Integrated Sanitation focused on eliminating such inequalities and mobilizing the poor and vulnerable communities to actively participate in the **elaboration of a municipal public policy for the whole city**, which produced a

roadmap that became adopted as a municipal public policy in 2002. The system, that in addition to water and sanitation coverage envisaged interventions of urban reform (paving, relocation of households located in dangerous or unsuitable places), provision of in-house sanitation facilities, environmental health including disease vector control, and environmental and health education, **succeeded in entirely transforming some of the most deprived areas of the city into liveable, dignified neighbourhoods**. This was not a top-down intervention, although it was implemented by the State with heavy funding, as the local authority implemented an **effective training programme to facilitate the participation of the local communities in the close monitoring** of the public works. Also, the local authority created mechanisms to ensure that both the municipality and the public utility were **easily accessible and accountable** to the local communities, including a physical local presence to ensure a rapid response to emerging problems with the provision of services. These and other radical measures were made possible because in the municipal elections of the year 2000, a political alliance led by the Workers' Party won the contest on a platform that had placed the solution to the deficit of WSS in vulnerable communities as a top priority, and lived up to the campaign promises. Once again, in this case, the evidence from our research prevents us from romanticising this experience. As shown in our case study report for this experience, despite the significant achievements of the intervention, electoral politics eventually led first to the weakening of the model and later to its progressive dismantling from 2005 and onwards (Castro and Ferreira, 2015b). However, the main lessons emerging from this study remains very powerful and reinforce our argument about the **fundamentally political nature** of the factors and processes that explain the success, but also the failures, of socio-technical interventions designed to democratize WSS, especially in relation to vulnerable communities.

All the examples of socio-technical innovations studied in DESAFIO provide important lessons that may contribute to the development of policies that help to consolidate and advance the democratization process. The cases discussed briefly in this section are probably the clearest to illustrate the potential of these innovations in this regard. In the next section, we focus on the emergence of these innovations, which was the focus of DESAFIO's second research question.

## **4. The emergence of socio-technical innovations**

DESAFIO's second research question addressed the emergence of the innovations, as another key objective in our project was to better understand:

*What conditions, factors and processes facilitate the emergence of socio-technical innovations that seek to democratize the access, the politics, and the managerial-operational activities in relation to essential WSS?*

This question led us to examine the context, including the historical processes within which the innovations studied first emerged. As explained before (see also Figure Nº 1), most of the innovations studied in DESAFIO emerged during the 1980s and 1990s,

two decades that were marked by socio-economic and political transformations that had far-reaching implications for the provision of essential WSS worldwide. This was particularly the case in LA&C, a region that became an experimental field for policy reforms in the WSS sector, including the countries covered in the study. We examined in some detail these issues elsewhere in this project (Castro, 2015a,b; see also Castro, 2004), and therefore only provide here a summary of key elements:

- The return to democratic rule after the civic-military dictatorships in Argentina (1983) and Brazil (1985) fostered the democratization process and strengthened initiatives to decentralize the State and empower local authorities
  - in Brazil, a new Constitution passed in 1988 granted significant autonomy to municipalities in relation to essential public services
  - in Colombia, similar movements to decentralize and democratize the State gained momentum in the 1980s leading to the introduction of decentralization reforms in 1987 and a new Constitution in 1991.
- Another important development that played a central role in the transformations introduced in this period was related to the “appropriate technologies” debate, which was grounded on a critique of conventional development programmes and mainstream economic thinking. Appropriate technology meant technologies that
  - are small in scale and appropriate to local contexts
  - tap local sources of raw materials, energy, and labour
  - are simple enough and affordable to make them widely available
  - involve local communities directly in their management and maintenance
  - give the poor access to benefits that were before reserved to the rich and powerful.
- Counteracting the forces of democratization, neoliberal and neoconservative policies since the 1980s contributed to the weakening and dismantling of the State’s capacity to regulate and directly provide essential public services, including WSS.
  - These policies found a fertile ground because there was much appetite for decentralization of powerful State monopolies, which for decades had been perceived as a source of inequality and injustice.
  - Neoliberal and neoconservative initiatives tapped and often co-opted long-standing traditions of solidarity and reciprocity characterizing Latin American and Caribbean cultures to promote the notion that the poor should help themselves rather than expecting State interventions to tackle structural inequalities.
  - Also, within the prevailing neoliberal and neoconservative framework of the 1980s and 1990s, the arguments for small, context-sensitive, locally appropriate, and especially **low-cost technologies** were often used to complement public policies seeking to free the State from the responsibility to provide essential services to the population. This particular understanding of the “appropriate technology” approach often contributed to reproduce rather than eradicate structural inequalities and injustice in relation to WSS, consolidating a division between

- technologies for the established social sectors and “technologies for the poor”.
- These policies, in a context of extreme financial crises during the 1990s, contributed to further curtail citizenship rights by reducing the State’s capacity to provide for the most vulnerable sectors of the population. A major objective of these policies was to free the State from such responsibilities, and make the poor take responsibility for their own needs.
  - The contextual conditions of the 1980s and 1990s also nurtured alternative innovations that resisted the neoliberal policy framework promoted in the WSS sector. These innovations were advanced by citizen organizations, social movements, community organizations, progressive sectors of the Catholic Church, committed academics and political actors, among others.
    - The alternative innovations that emerged as a result were informed by political objectives and principles grounded on the understanding that the democratization of WSS required establishing democratic social control of the State institutions by the citizenry.
    - Therefore, rather than freeing the State from responsibility for the provision of essential WSS, these forces sought to radically transform the role of the State to put an end to the protracted conditions of inequality characterizing the provision of public services. Eradicating these conditions of inequality required not only the universalization of access but also the creation of the relevant institutional mechanisms to make the State and the public institutions in charge of essential public services accountable and subject to democratic social control by citizens and users. It also required a strong role of the State in the direct provision of services, including heavy public investment to reverse the situation of chronic deficit affecting vulnerable communities.

Therefore, the contextual conditions of the emergence of the socio-technical innovations studied in DESAFIO consisted in a very **complex and evolving configuration of socio-economic, cultural, and political forces** that was far from being monolithic and that adopted different forms and dynamics in the different territories, including the three countries involved in the project. In consequence, the different factors and processes summarized above evolved over time in diverse forms and with often diverging results. Although our project results **do not allow us to ascertain with precision the influence of the contextual conditions**, innovations like the Condominial Sanitation system (Castro and Ferreira, 2015a), the Integrated Rural Sanitation System (SISAR) (Freitas et. al., 2015; Brown, 2015; Passos et. al., 2015; Cortez, 2015; Alves, 2015; Melo [CVS], 2015; Sobreira, 2015), the community-managed rural water and sanitation systems in Colombia (Peña et. al., 2015a,b), and the Integrated Sanitation system (Castro and Ferreira, 2015b), in different degrees, **all borne characteristics inherited from the prevailing conditions of the period** (for details, see Castro, 2015b). However, and although it is possible to establish clear differences between the innovations studied along the lines of the characteristics identified, **the evidence does not allow us to pigeonhole these experiences mechanically**. For example, despite the



stated policy objectives of neoliberal policies that clearly influenced some of the innovations studied, **the reality in the ground was much more complex** and our case studies show that innovations that emerged under the influence of the neoliberal context **did not necessarily deliver neoliberal outcomes**. Once implemented, these innovations sometimes evolved into **complex configurations** because of the widespread social resistance to neoliberal and neoconservative policies, owing to the influence of the local context and the interplay between local actors in the ground, or because the success of the innovations led to significant re-adaptations of the innovations and the diversification of their original objectives.

In this regard, among the key project findings that have relevance to tackle the situation affecting vulnerable communities it is worth highlighting the **interplay between structural determinations and social actions** that underpin democratization processes. While some of the innovations were clearly triggered by **conscious decision making grounded on well-planned political objectives**, others emerged from the **combination of unpredictable events**. This the case in Mondomo, Colombia, addressed in our case study WP3.3. The destruction of the local water system by the 1994 earthquake triggered the articulation of several processes that had been maturing locally and a complex array of social actors, bringing together the **adoption of inter- and transdisciplinary approaches for the development of technological interventions** at the regional university UNIVALLE, our research partner in DESAFIO, with **the active mobilization of the local population** that sought to improve their living conditions after the disaster.

In this connection, although the socio-political and economic-financial structural conditions that provided the context and some of the triggers mentioned in the examples above contributed to the emergence of the innovations, this always happened in a **dynamic process of interplay between these structural forces and conditions and social actions informed by a wide range of perspectives and objectives**, often in contradiction with each other. In a similar way, the experiences of success or failure and the replicability of the innovations under the study must be examined as the result of this complex interplay between structural forces and conditions and the manifestations of individual and collective agency initiatives and projects, which we consider next.

## **5. Success and failure of the socio-technical innovations**

Another key objective of our project was to understand the reasons that explain the long-term success of these innovations. Our main research question related to this objective was:

*What are the critical requirements to make successful socio-technical innovations sustainable and replicable?*

Many of the factors and processes discussed in Section 3 in relation to the emergence of the innovations also had a significant role in their success and replicability. We summarize these below.

**Local community involvement.** Our ten case-study reports provided substantial evidence of the significance of local community involvement for the success of the innovations studied.

- In some cases, the solution to the lack of drinking water in vulnerable communities was the **exclusive result** of local community action to organize and maintain a system to solve the problem, **in the absence of external support**, whether public, private or else. This is the situation that we found in Queimados municipality in the Rio de Janeiro Metropolitan region. However, as explained in the case study report for this experience, the conclusions of the research for this case **do not allow us to promote this particular community-led solution as a viable innovation** that we think should be maintained or replicated. It poses significant risks to the population and reflects the lack of responsibility showed by the public institutions responsible for the conditions of vulnerability affecting the local community (Britto et. al., 2015).
- In the cases that we consider to provide the clearest examples of successful socio-technical innovation, a fundamental requirement for their success was community involvement.
  - In the cases of Mondomo, Colombia, and Recife, Brazil, we find probably the clearest examples among our cases of a strong record of **pre-existing community organization and leadership** that was a determining factor of success (Peña et. al., 2015b; Castro and Ferreira, 2015a,b). Also, the experience of the SISAR system in the Brazilian state of Ceara was made possible by the long standing tradition of community associations that facilitated the implementation of this innovation, which requires a high degree of community participation (Cortez, 2015; Alves, 2015).
- Nevertheless, in all cases there was a need for **external interventions to promote community involvement**, either because it would not happen spontaneously (e.g. because the communities did not trust the external agents implementing the innovations) or because there was a need to **target, restrict, or otherwise channel community participation in a certain direction** to achieve success.
  - In some cases, there was a need to guide existing or externally promoted community participation to **train local people and help them to appropriate the knowledge** needed to take charge of the systems and become responsible for their long-term maintenance.
    - This happened for instance in the two Colombian cases, where the university played a crucial role in training community members and developing participatory activities to raise awareness and facilitate the appropriation of the innovation by the users, keeping a **permanent relationship to support the community in the long-term** running of the systems.
    - It is also the case of the SISAR in Brazil, where SISAR **provides training to the local community associations** to

take charge of the system after its construction, with a **strong technical support from the State public utility**.

- Also the Condominial Sanitation system as implemented in Recife, Brazil, involved externally induced forms of participation **to make sure that the local community agreed to the implementation of the system** in their neighbourhood by signing a “Condominial Agreement” with the municipality or public provider. This formal agreement involved a commitment by the community to contribute with funds, labour, or materials for the construction and for maintenance of the system over time.
- Although the Integrated Sanitation system also implemented in Recife, Brazil, addressed community involvement with a more radical approach, it also required **substantial external inducement to guide community participation**.
  - There was a need to introduce significant institutional changes to make sure that community members were given a strong say in the design of a municipal public policy framework to tackle the situation of vulnerable communities for the whole city.
  - Community members were also trained to monitor the implementation of the system by the municipality and were provided with specific institutional arrangements to facilitate the monitoring of the maintenance and running of the system over time.
- The intervention implemented in the Quilombola community of Lagedo, Minas Gerais, Brazil was benefitted by existing mobilization of the local community over issues such as the regularization of land ownership. However, getting the local people effectively involved in developing a water filtration system suitable to their context required **strong external inducement from the researchers**. This included **training and participatory activities** to raise awareness among community members about the quality of local water sources and to help them to take charge of the management of the system after its implementation (de Pádua et. al., 2015).
- In the intervention implemented in Santa Fe, Argentina community involvement was fully induced by our partner UNR working with local secondary school teachers and students with the objective of raising awareness about the quality of local water sources and **fostering the empowerment of the community** to monitor provincial and municipal public policies in the sector of WSS (Portapila et. al, 2015).

Another important finding is that, independently of the degree of success of the innovation or the specific weight that community involvement might have in explaining such success, there exist **different, even rival understandings of what exactly “community participation” should involve**. These different and rival understandings

are rooted in different principles and objectives, including **diverging understandings of the democratization process and about the very meaning and extent of “democracy”**. We have discussed this in more detail elsewhere in this project (Castro, 2015a). In some cases, like the Condominial Sanitation system, explicitly **the participation is restricted to the formality of the Condominial Agreement** that must be signed by each local neighbourhood, which is basically a commitment to the co-management of the sewerage system. This has been the subject of much criticism of this innovation, which we have discussed in some length in the relevant case study report (Castro and Ferreira, 2014a). Similar criticisms have been directed at the SISAR system implemented in Ceará, pointing at the fact that **community participation is mainly restricted to the co-management** of the system and does not involve more meaningful engagement (Freitas et. al., 2015; Brown, 2015). In the case of other innovations covered in the study, the notion of participation in principle goes beyond the more instrumental aspects, such as the construction and management of the systems, and **includes the social and political appropriation of the innovations**. This is particularly the case in the Integrated Sanitation system implemented in Recife Brazil, and in the two Colombian cases of community-managed WSS (Peña et. al., 2015a,b; Castro and Ferreira, 2015b). In the last analysis, the crucial difference is between innovations that understand **participation as a potential vehicle to tackle structural social inequality and injustice**, and those that **limit participation to the more instrumental aspects** of the implementation of the innovations, such as persuading the population to accept the introduction of the intervention in their locality and the responsibility to co-manage the system over time.

**Meaningful and sustained external support.** Although community involvement is clearly a crucial factor of success that we identified in the socio-technical innovations studied, our research confirms a well-known fact that has been widely addressed in the existing international literature on the topic: **community participation has severe limitations**, and it could even become an obstacle rather than a vehicle for substantive democratization. Our findings show clearly that sustained and meaningful external support, particularly from the State, is a **deciding factor in the sustainability of the innovations**. This is the case even in situations where the implementation of innovations inspired by the appropriate technology approach provided for systems that are relatively inexpensive and simple to run by the users, as in the two Colombian cases of community-managed WSS (Peña et. al., 2015a,b).

An important point that must be highlighted here is that there exist important, deep-rooted contradictions in the understanding of key concepts related to these processes, particularly “autonomy”, “emancipation”, “independence”, and their opposites, such as “heteronomy”, “subordination”, and “dependence”. We do not have room in this brief summary to deal with these and other relevant conceptual debates, which we will address in the publications emerging from DESAFIO. However, it is important to point here some key, relevant points. Several of the innovations studied in DESAFIO were influenced by a strand of thinking in public policy, with deep roots in intellectual and political traditions, that argues for the self-sustenance of, particularly, small rural communities. Much emphasis is placed on helping these communities to achieve independence from external actors, in particular the State. In the extreme, it is expected that the communities will become fully self-sufficient. A pitfall of this approach

is that although the conceptual dichotomies (e.g. autonomy-heteronomy) are a fundamental step in the development of thinking about these processes, if we remain trapped in dichotomic argumentation we fail to make observable the complex relational processes at stake. In practice, the implementation of the innovations studied in DESAFIO, as most other complex processes, are in a permanent flux and evolving into **interdependent configurations** that are difficult to foresee, let alone control, by any single actor. There is a high risk if the innovations implemented to solve the problem of poor, vulnerable communities have complete independence from outside actors as the final goal, for instance by becoming financially self-sustaining. We found evidence in our research showing that even when the innovations are successful, **their long-term sustainability is always dependent on some degree, often a very strong degree, of external support**, especially in financial and technical matters. Why should it be otherwise, if even in well-off urban centres the provision of essential public services, including WSS, are heavily subsidised and supported by the State? The idealization of “full-cost recovery” policies may remain strong in some sectors of the public policy community, but it is more a political, even ideological project than a reality empirically verifiable. Why asking it from poor, vulnerable communities, whether rural or marginal urban, if full-cost recovery is not achieved even in wealthy urban centres?

In this regard, greater autonomy in the search for political emancipation cannot be achieved in isolation, as the democratization process is **fundamentally interdependent**. The social and political interdependence characterizing democratization processes, up to this historical stage, tends to crystalize in **institutional configurations of coordination**, where autonomy and heteronomy are in permanent tension. Full community self-sufficiency, even if it were achievable, is not necessarily a path to democratization, and may be on the contrary the result of increasing social polarization and inequality.

**Successful innovations and interdependence.** The lessons emerging from our project indicate that community involvement and self-determination are as important as external intervention and support, and successful experiences are clearly made possible by a combination of these two factors, whereby **external support tends to be critical for the long-term sustainability of the experiences**.

- In the two Colombian cases, the university, our partner UNIVALLE, has provided continued support to the community to facilitate the running of the systems over time. This has been necessary owing to the lack of State support for rural WSS in the country. In addition, there is a clear tendency to a decline in community participation over time, which the university has identified. One initiative to counter these negative trends has been to support the creation of regional organizations to bring together community-managed rural WSS in order to support each other. These organizations are meant not only to strengthen existing community-managed rural WSS but also help replicating the model based on the innovation implemented in the two cases studied by DESAFIO (Peña et. al., 2015a,b). The success of these two cases suggests that the model has significant potential for replication.
- In the case of SISAR, although the original goal was community self-sufficiency, eventually the provincial public authority CAGECE, our partner in DESAFIO,

had to step in to provide sustained strong support to ensure the survival of the systems. CAGECE has created a special management unit to support all SISAR units (Cortez, 2015; Alves, 2015). This model has been successfully replicated across the state of Ceara and is now promoted by the IFIs and some donors as a system that can be replicated in other countries. Also, the Brazilian government is considering the possibility of adopting SISAR as one of the policy options for rural sanitation in the country.

- Although the experience of the Condominial Sanitation system in Recife was a failure, the innovation has been highly successful elsewhere (Castro and Ferreira, 2015a). For example, it was adopted in the 1990s by the public WSS utility of Brasília, the country's capital, where it became the preferred option for the whole city, serving rich and poor alike very successfully. A major reason for this success is that the public utility has created a special management unit dedicated to Condominial Sanitation, and provides full support to the users (Montenegro, 2015b; Rissoli, 2013, 2015). **There is little community involvement here, and the system operates like a conventional sanitation system.** The innovation has been replicated in Brazil and worldwide and has been promoted by the World Bank, the Inter-American Development Bank, and other international agencies.
- The Integrated Sanitation system also implemented in Recife, Brazil, is a successful example of how to tackle holistically the different dimensions of vulnerability: lack of safe drinking water, sanitation, in-house facilities (toilets, showers), drainage, urbanization including housing and pavement, solid waste collection and disposal, disease vector control, and other related aspects. Although community involvement is fundamental in this innovation, this involvement takes place in the design and monitoring of public policy, implementation, and long-term management of the system. **It is not expected that poor communities should take charge of the systems themselves**, whether by investing financially or in kind for the construction of the infrastructure or in the long-term activities of maintenance and operation. Owing to its holistic approach, this is an expensive system, and it is grounded on the assumption of a **strong State leadership and commitment to make the necessary investments and maintain the infrastructure and operation over time** (Castro and Ferreira, 2015b; Miranda Neto, 2014, 2015).

To close this section, the lessons emerging from the research clearly show that although the requirement of sound techno-infrastructure and operational design and performance is critical, the evidence indicates that the **crucial success factors** for the long-term sustainability and replication of socio-technical innovations are **socio-economic, cultural, policy-institutional, and, fundamentally political**. This conclusion has been emphasised by the technical experts that we consulted during the research, many of whom were designers or implementers of some of the innovations studied (e.g. Melo, 2014, 2015; Miranda Neto, 2013, 2014; 2015; Montenegro, 2013, 2014a,b). Summarizing, we identify three main success factors for socio-technical innovations oriented to solve the deficit of WSS in vulnerable communities: firstly, **the fundamental role of the State** support in the funding of the infrastructure and in guaranteeing the long-term sustainability of the systems. Secondly, **meaningful social**

**participation** that is not restricted to the tokenistic or instrumental involvement of the user communities is a crucial factor when the running of the system relies heavily on co-management. Thirdly, **the significance of other forms of external support**, for instance technical advice and training provided by universities and State agencies, to empower and facilitate the appropriation of the innovations by the user communities and enhance their levels of autonomy and wellbeing.

## **6. Obstacles facing socio-technical innovations**

DESAFIO's other important objective was to understand concerned the factors and processes that help to explain the failure of innovations:

*What are the key obstacles to the sustainability and replication of the innovations?*

Our findings here confirmed our overall assessment that the main reasons for both success and failure are not related to the techno-infrastructurel and operational dimension, as we anticipated in our original project proposal:

We argue that these deficiencies [in the provision of safe WSS to vulnerable communities] are neither caused by unfortunate environmental constraints nor by a shortage of scientific and technical knowledge or by the unavailability of technological solutions, even in the poorest countries (DESAFIO, 2013: 3).

In most cases, the innovations studied relied on existing techno-infrastructurel and operational knowledge and practice that has been in use for decades. As discussed above, the key to the innovations has been the **assemblage of existing techno-infrastructurel and operational knowledge and practice in new configurations** that challenge the status quo based on top-down policy and management and large-scale, centralized WSS. For sure, techno-infrastructurel and operational factors play a role in the failure of some innovations, and among the experiences studied in the project perhaps the best example was the implementation of the Condominial Sanitation system in Recife, Brazil, covered by case study WP2.2. As explained in our report for this case, the CS system is an intervention exclusively focused on providing sewerage, disconnected from other infrastructure services. In the case of Recife, this became a major problem given the low level of coverage of these services, especially urban drainage, given that Recife is a city built on low-lying lands in a river mouth, much of it on soil reclaimed from mangroves. The high water table, combined with the impact of the tidal cycle on river levels, is a major problem for the provision of essential WSS in the city, which demands holistic interventions that tackle simultaneously the introduction of WSS networks with the provision of adequate drainage and other infrastructures. The exclusive focus on sewerage, disconnected from other infrastructure services, characterizing the original model of the Condominial Sanitation system implemented in Recife became a major obstacle for the project's success and a key reason of failure. Nevertheless, even in this

case techno-infrastructure and operational factors were not the key reason of failure, as the system could have worked if all the necessary requirements, including complementary infrastructure services, had been in place, as suggested by the successful implementation of the system in many other locations.

In this regard, our findings suggest that the factors and processes that constitute the main obstacles are similar to those explaining the success of the innovations. These are mostly **socio-cultural, policy-institutional, and political** issues, which was confirmed in our interviews and exchanges with technical experts, that included the designers of the Condominial and Integrated Sanitation systems implemented in Recife (e.g. Melo, 2014, 2015; Miranda Neto, 2013, 2014; 2015; Montenegro, 2013, 2014a,b). Even the failures identified in the techno-infrastructure and operational aspects, for instance the inadequate infrastructural performance of the Condominial Sanitation system in Recife or the partial failure to fully comply with drinking water parameters in some of the SISAR systems (Passos et. al., 2015) can be mainly explained as **failures in the public policy and institutional domain**. In addition, **socio-cultural and political aspects** also play a fundamental role in the explanation.

**The limits of community participation.** The implementation of the Condominial Sanitation system in Recife contains important lessons in this regard. In particular, the reliance on users for much of the construction, maintenance, and operation activities led to critical problems

- The **scale and intensity of the participation diminished over time**, in part owing to the normal attrition of the participative processes, but also owing to the **frustrations of the community** provoked by failures in the implementation, management, operation, and maintenance of the system.
- The part of the condominial network that was completed only worked partially, because the construction of the domestic connections (the connections between the households and the network) was a responsibility of the users, and a large majority never built them for different reasons. This led to the rapid deterioration of the condominial network. Later, the Municipality built part of the missing domestic connections, but then many users decided to disconnect their homes from the network owing to serious operational and management problems. Most of them connected their domestic sewers to the drainage network or just emptied the sewage into nearby water bodies or even the streets.
- The urban dynamics typical of poor areas, characterized by spontaneous and unplanned construction, created serious problems for the system. Specially the building of new facilities inside the homes often led to the construction of rooms, paving, or other items on top of the networks that had been constructed inside the properties, in the back or front gardens, which turned impossible the operation and maintenance of the system. Also, the “Condominial Agreement” was too often broken by the users, for example by closing access to the sewers inside the property, often covering them with cement or other hard surfaces, for a number of reasons, including to avoid the bad smell inside the property, because of quarrels between neighbours, or because new tenants or homeowners that came after the implementation of the system often were not alerted of the existence of



the “Condominial Agreement” or did not feel obliged to stick to it, as they had not been part of the original process.

However, the limits of community participation became apparent in other cases too, particularly in those innovations that are highly reliant on it. For instance, in the case of the community-managed WSS in La Vorágine, Colombia, covered by case study WP2.4,

- The very success of the innovation is reducing the vitality of community participation, as the local population considers that the system is properly managed by the current board of the community association, which is composed a very few members who are burdened with most tasks. The findings of this study suggest that “the collective capacity to tackle disrupting factors related to the management of WSS services has been gradually declining” (Peña et. al., 2015a: VI).
  - This has created a vulnerability in the system, as one single person is currently responsible for most operational and administrative tasks, and there is no obvious replacement for this person.
- The study identified a number of additional causes that may explain the fall in community engagement threatening the long-term sustainability of the system, including
  - Recently arrived or younger members of the community lack the historical memory of the innovation, as they were not part of the participative process of design and implementation
  - There has been an exodus of young community members who had the potential to become community leaders, who leave in search for better work opportunities in the provincial capital Cali. As a result, the community board in charge of the WSS is finding hard to fill several vacant posts.
  - There are now women involved in the management of the WSS, which reinforces the gender imbalance detected in the process of community participation.

Similarly, the case of SISAR in Ceara, Brazil, provides further example of the limits of community participation as an obstacle for success and replication of the innovations. Despite that system is organized around the requirement of continued community engagement in the co-management of the system, our study found that “perhaps the major weakness [of SISAR] is that of social participation” (Freitas et. al., 2015: 49). The study found several indicators of this weakness, including

- Low or declining frequency of participation in the meetings of the community associations in charge of the systems, caused by
  - lack of engagement with community life at large
  - but also because after the successful implementation of the water supply system many people lose the incentive to participate and prefer to use their time in other activities perceived as more rewarding

- as SISAR is limited to the provision of water supply, the impact of the external inducement of social participation is greatly restricted
- the exodus of young people to urban centres in search for better opportunities is creating problems for the eventual replacement of current community leaders, which is perceived as a major risk for the long-term sustainability of the model.

These examples illustrate a common pattern across our case studies confirming that the limits of community participation constitute a major obstacle for success and replication of the innovations, to the extent that co-management and other forms of intensive community involvement are key requirements for their functioning.

**Poor or lack of State support.** This factor is intimately connected with the previous one. As seen before, strong and sustained external support, particularly from the State, is a major factor of success in the cases studied, and the weakness or absence of this support is conversely a key obstacle for the long-term success and replication of the innovations.

For instance, in the case of SISAR, the fact that the intervention is restricted to the provision of water supply in the absence of a more holistic approach is a fundamental weakness. Although **this is not a weakness of SISAR as an innovation**, in the absence of State policies to enhance the quality of life of vulnerable rural communities, the potential impact of SISAR is severely diminished and this in turn may limit the capacity and willingness of the population to engage more fully in the co-management of the system. Our study found that despite the fact that SISAR's introduction of water supply is a major advance, the rural communities where the studies were carried out point at the lack of State support for the provision of a range of essential services, including cultural facilities, public health, basic education, local transportation, pavement, solid waste collection and disposal, etc. (Freitas et. al., 2015: 49).

Another example is provided by the study on the Condominial Sanitation system implemented in Recife (Castro and Ferreira, 2015a). The major reasons of failure identified in this case were:

- Lack of long-term inter-sector collaboration between the relevant actors in the public sector. This included,
  - Lack of political decision, both at provincial and municipal level, to design an institutional framework to guarantee the continuity of management, operation, and maintenance activities of the system in the long term;
  - Particularly lack of involvement of the public utility COMPESA, which had a strong preference for conventional sanitation infrastructure and refused to take responsibility for the management of the alternative Condominial Sanitation systems that had been introduced by the municipality
  - Lack of continuity and prioritization in the implementation of the system, expressed in the poor allocation of financial resources allocated to the implementation in its early stages and later in the outright abandonment of the project.

- Absence of a campaign to raise awareness and keep the population alert in relation to their duties in co-managing the system, which requires a permanent domestic operation to keep the system working (avoiding and clearing blockages, solidary collaboration between neighbours, etc.).
- The lack of valorisation of water, WSS, and the environment at large by the authorities and the service providers, and by the users more generally.

Summing up the lessons from this case, the **reliance on users** for much of the construction, maintenance, and operation activities, **in the absence of sustained support from the State** (e.g. in environmental and hygiene education), led to critical problems. This problem was compounded by increasing conflicts between members of the “condominiums”, the neighbours, arising from system blockages caused by **misuse and other issues leading to the break of the “condominial pact”** that eventually provoked the abandonment of the systems by the community. However, the **lack of continued State support for the system** was a major factor of failure, particularly the **non-compliance with investment commitments** to complete the construction of the infrastructure and the **lack of support for maintenance and operational activities in the long term**.

The experience of the Integrated Sanitation system, also implemented in Recife, Brazil, further confirms the weakness or lack of strong and sustained State support as a crucial obstacle for success and replication (Castro and Ferreira, 2015b). Although this was a successful experience given that it achieved the specific objectives of the intervention in relation to the techno-infrastructure dimension, **the long-term sustainability and replicability of the system became seriously compromised owing to changes in political priorities that led to the abandonment of the original strategy**. The most important institutional reforms foreseen by the original project to empower common citizens to participate in the approval and monitoring of municipal public policies **were never implemented and were eventually abandoned**. Likewise, the mechanisms created by the local authority to make the municipal and provincial authorities and the public utility more accountable to the citizens and users **were progressively scrapped**. **The abandonment of the commitment to introduce substantive political and institutional reforms led to the failure of the original project** in Recife. In our interviews with the designers of the innovation, we also learned that a similar experience of failure caused by abandonment of State support for the system as a result of changing political priorities and electoral politics had also been a major factor of failure in previous experiences with Integrated Sanitation (Miranda Neto, 2013, 2014; 2015; Montenegro, 2013, 2014a,b).

The study of SISAR also provides evidence of the significance of poor or lack of State support as an obstacle for success. Despite its success, **SISAR has not yet achieved institutional stability and has been under threat of political decisions that could seriously affect its continuity, at least in its present form**. The **lack of a national policy for rural WSS** in Brazil may be a **constraint** for SISAR’s potential development, although a new national framework for rural WSS could also become a **threat** to SISAR as it could favour other alternative systems as the preferred choice of government policy for rural WSS. In any case, **the lack of a national policy framework is a source of uncertainty for the future of rural sanitation**, and this has potential consequences for

the SISAR system. At the local level, the implementation of SISAR units is often marred by a **political context characterized by a strong culture of clientelism within which the system has to operate** (Alves, 2015). There is much room and need for concerted State action to improve the living conditions in rural communities in Brazil, which requires policies where drinking water supply interventions as SISAR form part of an integrated approach to eliminate structural inequality and injustice. However, there is a lack of integrated approaches for rural WSS in the country (Freitas et. al., 2015).

The case studies on community-managed WSS systems in Colombia also reinforce the findings that a major obstacle for the success of socio-technical innovations to democratize WSS to tackle the situation of vulnerable communities is poor or lack of State support. Like in the case of Brazil, Colombia still lacks a national framework for rural sanitation, which is a source of **uncertainty for the long-term sustainability and replicability** of the innovations studied in WP2.4 and WP3.3. Also, there is a pattern of lack of technical and financial support for the tens of thousands of rural WSS existing in the country, which is major **impediment to the expansion and consolidation of community-managed WSS** in a context where there are few if any alternatives for the rural population. In addition, the introduction of new regulatory arrangements for WSS in the country generated a homogenous regulatory framework that fails to take into account the specificities of rural WSS managed by communities or small local authorities, which are subject to similar bureaucratic burdens as public utilities in large urban centres (Peña et. al., 2015b: V). These problems are compounded by the fact that, at least officially as a result of joining the Pacific Alliance jointly with Chile, Mexico, and Peru, Colombia has adopted the neoliberal framework for WSS that **promotes privatization and mercantilization of these services and the retreat of the State from the activities of provision and funding of these services**. This approach to the provision of WSS is a **major threat to the process of democratization** of the politics and management of these essential services (Castro, 2015b). For example, the current regulatory system for WSS was designed for large, commercialized WSS utilities but apply to all WSS providers, including small community associations like those studied in DESAFIO, which are now regulated by private law. That is, their status as not-for profit entities organized on the basis of solidarity, cooperation, and community engagement is not recognized in the legal and regulatory frameworks, which were designed to promote market-oriented WSS wholesale. This, combined with the lack of a national policy for rural WSS constitute a major threat to the long-term success of the innovations (Peña et. al., 2015b).

Summing up this section, we just summarized relevant examples from our findings showing a **pattern of common factors that constitute significant obstacles** for the long-term sustainability and replication of the socio-technical innovations studied. We emphasised particularly two main factors: the limits of community participation, and poor or lack of external support, particularly State support for solutions oriented at tackling the deficit of WSS affecting vulnerable communities. Our research also found evidence of additional obstacles facing the replication of the innovations when exported to other regions and countries. Although our project did not include an in-depth study of such experiences, in our interviews and exchanges with experts in the field we learned about **failures in the replication of innovations in other settings caused by cultural, institutional, and political differences** (e.g. causes of failure in the implementation of the Condominial Sanitation system developed in Brazil when introduced in Bolivia and

Peru). We also found evidence that the innovations have been often **adapted to suit different conditions**, even introducing radical modifications to the original model, as has been the case of the implementation of the Condominial Sanitation system in Brasilia or Salvador in Brazil, where community participation has been almost entirely replaced by conventional management by the relevant public utility. These and other aspects are worthy subjects for future research.

## **Conclusions**

DESAFIO was a study about the democratization process in the field of essential public services, with an empirical focus on the situation of WSS affecting vulnerable communities in Brazil, Colombia, and Argentina. We studied a range of socio-technical innovations developed and implemented in these countries, concentrating our focus on the period started in the 1980s. We studied these socio-technical innovations in their character of **vehicles of the process of democratization of politics and management in the WSS**. Our main interest was to ascertain the capacity of these innovations to transform the prevailing status quo in the sector of WSS, which is a major reason for the unacceptable conditions affecting vulnerable communities in LA&C. As discussed in the first section, despite official claims to the contrary, the evidence shows that strictly speaking the MDGs set in the year 2000 have not been achieved, and vulnerable communities continue to suffer the worst effects of this failure. In this regard, the socio-technical innovations studied in DESAFIO contain significant lessons and ample evidence of the potential to overcome the current crisis of WSS in the region. We learned about the factors and processes that contributed to the emergence of these innovations, as well as about those that help to better understand the successes and failures affecting the long-term sustainability and replicability of the innovations.

In our original proposal, we had identified a range of indicators to guide our project in the attempt to contribute towards advancing the state of the art in this field. Table Nº 2 reminds us of these indicators.

**Table N° 2. Synthesis of key indicators of progress beyond state of the art**

<b>Status Quo</b>	<b>Progress Expected</b>
Prevalence of technology-centred solutions (technological fixes, etc.)	Evidence-supported, people-centred socio-technical innovations
Dominance of North-South flows in technological transfer	Re-balance of the relationship through bi-directional North-South flows and renewed emphasis on South-South interactions
Persistence of disciplinary entrenchment; split between “hard/soft” scientific disciplines and similar divides (i.e. between natural, technical, and social sciences, humanities, etc.)	Inter-disciplinary and holistic approach grounded on sound methodological basis
Protracted poor (or lack of) communication between policy sectors (i.e. environment, WSS, public health, etc.)	Strategically oriented inter-sectoral coordination to foster effectiveness, efficacy and efficiency
Weak or non-existent civil society engagement, poor governance; instrumentalization of community involvement and participation; top-down, paternalistic solutions; emphasis on users’ acceptance of decisions taken by politicians and technical experts	Transdisciplinarity; involvement of communities, citizens, and users in all stages of the production of knowledge, and the implementation, monitoring and validation of socio-technical solutions; empowerment and appropriation of socio-technical solutions by local communities
Failure to meet basic needs of vulnerable populations due to political priorities of short-term interests over human wellbeing and sustainability	Re-orientation of policy priorities placing the satisfaction of basic human needs at the top of the political agenda; public policy and technological development in the WSS must be geared to this purpose
Popularization of “success stories” about people-centred approaches to WSS (e.g. Brazil’s condominial system; small scale “water vendors”, etc.) but failure to change the structural conditions that favour the overall reproduction of the status quo	Strong evidence to replicate and upscale existing projects and develop new successful socio-technical innovations by making them a political priority and a driver for structural social change

Source: DESAFIO (2013), p. 17.

We oriented our project work using these indicators as a guide both in the design of our research questions and in the methodological approach implemented to produce our results. The synthesis of main results presented in the previous pages presented evidence that DESAFIO makes a contribution towards advancing the state of the art along the lines of the indicators originally chosen.

- 1) The socio-technical innovations studied are clearly oriented towards transforming, in some cases radically, the prevailing techno-centric status quo and developing people-centred interventions to solve the problems affecting vulnerable communities. This is an area where DESAFIO makes a clear contribution.
- 2) DESAFIO certainly makes a contribution towards re-balancing historically prevailing North-South flows of technology and innovation with South-South and even South-North collaboration and cross-fertilization. Several socio-technical innovations studied in DESAFIO are clear examples of this re-balancing.
- 3) DESAFIO sought to transcend the prevailing approach in research and practice connected with WSS (and infrastructure services more generally), which is characterized by a protracted entrenchment into “hard” and “soft” disciplinary approaches. We made good progress in this regard. However, we also found that the entrenchment is so deeply rooted in academic and professional practice that not always our work was able to transcend the existing divides. Still, our results clearly show a commitment towards achieving the goal of meaningful inter-disciplinarity, which is characterized by the production of knowledge as a synthesis integrating the contributions of individual disciplinary contributions. Much more is needed though to achieve the level of inter-disciplinary coordination required to advance beyond the state of the art. This is also a worthy matter for future research efforts.
- 4) The research results also present evidence of successful inter-sectoral collaboration, and provide clear insights into the critical requirements, factors, and processes that help to explain their success and failure. Although meaningful and long-term inter-sector collaboration within State institutions remains an elusive goal globally, some of the socio-technical innovations covered in DESAFIO are excellent examples of the way forward.
- 5) DESAFIO has also provided an example of what we called in our original proposal “transdisciplinarity in practice” (DESAFIO, 2013: 46). On the one hand, most of the socio-technical innovations studied are examples of transdisciplinarity, some of them taking the principle well beyond conventional practice. In particular, the involvement of local communities in the production of knowledge and in the practical implementation of the innovations is the hallmark of several experiences studied in the project, most notably the community-managed rural WSS in Colombia (Peña et. al., 2014a,b), and the Integrated Sanitation system in Recife, Brazil (Castro and Ferreira, 2014b). On the other hand, our own research work involved relevant non-academic actors in all stages of the project. These included CAGECE, the provincial public utility in charge of SISAR, in Ceara, Brazil (WP2.1; WP3.1; WP4.2), public sector specialists and local community members working as researchers or research assistants at Partner UFPE in Recife, Brazil (WP2.2; WP3.2), local community members engaged in research activities in the study of community-managed WSS in Colombia (WP2.4; WP3.3), and similar involvement of community members if the interventions implemented in Minas Gerias, Brazil (WP4.1) and Santa Fe, Argentina (WP4.3). The actual level of engagement in the research process and

in the production of final project results varied significantly across the cases. In the same way that we found obstacles to fully develop an inter-disciplinary approach, as commented in point three above, we identified significant obstacles to practice transdisciplinary research, again largely owing to deeply entrenched academic cultures that resist the principle that the production of knowledge is not restricted to the academic sphere. Still, our project also makes an important contribution towards advancing the principle of transdisciplinarity.

- 6) Our findings from most case studies presented evidence both a) confirming the crucial significance of giving policy priority to the satisfaction of human needs over other objectives, such as profit making, and b) providing excellent examples of how this can be done with successful results. Our clearest example to this end is the experience of Integrated Sanitation implemented in Recife, Brazil (WP3.2).
- 7) The project findings, as summarized in Sections 1-6 above, provide substantial evidence of the conditions, factors and processes that helps us to better understand the emergence, success, failure and potential replicability of sociotechnical innovations aimed at the democratization of the politics and management of WSS.



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## **Original report cover – Article 2**



### **National, regional and EU policy guidelines for the provision of innovative WSS**

**Work Package 6 Report  
(Deliverable 6.2)**

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Newcastle upon Tyne, 31 July 2015

DESAFIO is a Collaborative Project (CP-FP-SICA) funded by the European Union's  
Seventh Framework Cooperation Programme. Grant Agreement N° 320303.



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## **Article 2**

# **National, regional and EU policy guidelines for the provision of innovative WSS**

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## **Introduction**

This report provides synthetic recommendations to support policy design and implementation grounded on DESAFIO's research results. DESAFIO studied experiences of socio-technical innovations designed and implemented to democratize the politics and management of water and sanitation services (WSS), with a specific focus on the situation of vulnerable communities. The report can be read alongside the Cross-comparative analysis focused on the situation of Latin America and The Caribbean (Castro, 2015b) and the final Synthesis of project results (Castro, 2015c), which are complementary. The reports has two sections. Section 1 provides the background and explores key aspects of the challenges that we face to meet the Sustainable Development Goals (SDGs) recently approved by the United Nations and that set the development agenda for the next 15 years. Section 2 presents a summary of policy implications derived from DESAFIO's findings and relevant policy recommendations.

## **1. The policy problem**

Providing safe, sustainable, essential WSS to vulnerable communities continues to be largely overdue in most developing countries. To deliver these basic services within a substantive democratic framework that prioritizes social efficacy and equality, accountability, and meaningful citizen involvement and participation in monitoring policy decision-making and implementation is more daunting and remains a largely elusive target even in the consolidated electoral democracies of Western countries.

The final reports on the progress made towards achieving the Millennium Development Goals (MDGs) showed that despite considerable advancements, access to safe water and sanitation services continues to be a major concern (UN, 2015a; WHO-UNICEF, 2014). The reports celebrate nominally reaching the target for reducing by half the proportion of the world's population that do not have access to "improved" water sources, although 45 countries out of 192 did not meet the target. The situation is even direr in relation to sanitation services. The reports confirm that only 95 countries out of 192 met the MDG target of halving the world's population without sanitation by 2015. According to the official reports

More than 700 million people still lack ready access to improved sources of drinking water; nearly half are in sub-Saharan Africa. More than one third of the global population –some 2.5 billion people– do not use an improved sanitation facility, and of these 1 billion people still practice open defecation (WHO-UNICEF, 2014: 6).

These official figures must be read with much caution. For example, the UN reports recognise that people with “improved” water sources may not necessarily have safe water (WHO-UNICEF, 2014: 42). In short, if we consider water quality, the number of people without access to safe drinking water in 2015 is much higher than what the official figures suggest. In addition, it is important to examine the MDG results in perspective. We must remember that the MDGs aimed at halving the proportion of the world’s population without access to these essential services. This was a step back from the more radical ambitions of the 1980s, when the UN International Drinking Water and Sanitation Decade had the goal of bringing 40 litres of safe drinking water to every human being in the planet by 1990 (UN, 1980). The universalistic goal of the 1980s was not achieved, as in 1990 there were 1.1 billion people, 17% of the world population, without safe drinking water, and 40% lacked basic sanitation facilities. Then, the MDGs set in 2000-2002 aimed at halving the proportion of the unserved population by 2015 (UN, 2000, 2002), a tacit admission that universalization of essential WSS was not to be achieved for at least two more decades. In this sense, the MDGs were timid, conservative, and even mean compared with the goals of the 1980s. Yet, we failed to achieve them in a very large number of the poorest countries. And even where there have been significant advances towards the MDGs, the evidence shows that it has been often achieved at the expense of increasing inequality and injustice:

[... There are] stark disparities across regions, between urban and rural areas, and between the rich and the poor and marginalized. The vast majority of those without sanitation are poorer people living in rural areas. Yet, **progress on sanitation has often increased inequality by primarily benefitting wealthier people** (WHO-UNICEF, 2014: 6; our emphasis).

The new Sustainable Development Goals (SDGs) approved in September 2015 setting the development agenda for the next 15 years have reaffirmed the universalistic rhetoric of the 1980s and in some ways have significantly raised the expectations:

On behalf of the peoples we serve, we have adopted a historic decision on a comprehensive, far-reaching and people-centred set of universal and transformative Goals and targets. We commit ourselves to working tirelessly for the full implementation of this Agenda by 2030. We recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development. [...] In these Goals and targets, we are setting out a supremely ambitious and transformational vision. We envisage a world free of poverty, hunger,



disease and want, where all life can thrive. [...]. A world where we reaffirm our commitments regarding the human right to safe drinking water and sanitation and where there is improved hygiene; and where food is sufficient, safe, affordable and nutritious. A world where human habitats are safe, resilient and sustainable and where there is universal access to affordable, reliable and sustainable energy (UN, 2015b: 3-4).

WSS are addressed in Goal 6, that among other important targets include

6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations (UN, 2015b: 18)

While the approval by the Un of the ambitious and universalistic development agenda for 2030 must be celebrated, there is a need to highlight some of the obstacles facing its achievement that are directly related to DESAFIO's main research problem, the democratization of the politics of WSS. In this regard, it is crucial to recognize that in the core electoral democracies there is no agreement on fundamental aspects of the approach needed to achieve the full universalization of WSS, and even universalization is not necessarily a shared goal for everyone in this group of powerful countries. In particular, it must be recognized that there exists a confrontation between inclusionary and exclusionary societal projects, which in the case of WSS finds expression in the status conferred to these essential services. For some, WSS should be treated as commodities that must be available only to those who can afford to pay their market cost, consequently excluding non payers from accessing these services. For others, access to WSS must be considered a public good that must be guaranteed by the State, which is the approach that allowed Western democracies to achieve the universalization of these services during the twentieth century (Castro, 2015a).

The confrontations between these divergent societal projects can be exemplified with the debate about the human right to water. This debate focused on the access to small amounts of water needed by human beings for a dignified life, estimated by the World Health Organization at roughly between 50 and 100 litres per person per day for domestic needs. For many years, a large number of governments involved in this debate **rejected the possibility of sanctioning the access to this essential water as a human right**. Finally, in July 2010 the governments of 122 countries voted in favour of the UN resolution and sanctioned the human right to water, but **41 countries abstained from the vote while 29 were absent** (Amnesty International and WASH United, 2014). This report provides an analysis of the reasons why governments abstained or were absent from the vote, which includes the governments of many of the leading countries of the world; most of them consolidated Western electoral democracies. Thus, the governments of many of the same leading countries that have “reaffirm[ed their] commitments regarding the human right to safe drinking water and sanitation” in the approval of the SDGs (UN, 2015b: 3-4) have also rejected to recognize that an essential amount of safe water to every

human being on the planet must be recognized as a right, just for being human. It is a stark example of the social, political, and ethical dilemma facing the implementation of the SDGs.

The example of the confrontation surrounding the UN approval of the human right to water in 2010 demonstrates that these opposing views are not merely rhetorical or idealistic positions but have rather **very practical implications for policy and implementation in the WSS sector**. The privatist agenda that considers WSS as commodities promotes a well-known policy package in the WSS sector, seeking the privatization and mercantilization of these essential services. These policies are exclusionary, are often implemented in the absence of democratic debate, and there is already significant evidence of their **negative impacts on the population, particularly on the most vulnerable sectors**. In our research, we found examples of how these policies are being promoted by International Financial Institutions (IFIs) and other actors in Latin America and the Caribbean (LA&C) despite the significant evidence available about their **negative impacts on poor and vulnerable communities** in the region and elsewhere (Castro, 2015b). An explicit example of the confrontation between these divergent societal projects is given in the following statement about the polarized situation characterizing the role of the State in tackling structural social inequalities, including inequalities in the provision of WSS, promoted by different national governments in LA&C:

There are [...] two well-differentiated visions of the role of the State in the definition of public policies and services management [in LA&C]. On one side, the countries of the Pacific Alliance, constituted by Colombia, Chile and Peru (in addition to Mexico in North America), which seek to achieve the liberalization of the economy, the free movement of people, goods, services, and capital. [...] The second block is integrated in the Bolivarian Alliance (ALBA) grouping 15 countries [including] Venezuela, Ecuador, Bolivia, and Argentina [note: Argentina is not formally an ALBA country but is included because it has similar policies according to the CAF report]. This group centres the attention on the struggle against poverty and social exclusion. It opposes reforms of the State that seek the deregulation and privatization of public services. Rather, these countries seek to strengthen the State and promote citizen participation in public affairs. They also propose State intervention to reduce social disparities. [...] In contrast], the countries of the Pacific Alliance propose a subsidiary role for the State, having market regulation as the mechanism. The State at all levels tends to stop being a direct service provider to become an articulator, a mediator between the actors providing public services. In this context, the regulatory capacities of the State are focused on improving the quality of the services and the efficacy and efficiency of the operators. It tends to promote private activity, which requires establishing clear rules and specific regulations (CAF, 2015: 13).

The Development Andean Corporation (CAF), a supporter of the Pacific Alliance of governments that have committed themselves to prioritize the privatization of essential

WSS, openly dismisses “State intervention to reduce social disparities”. This position seems to be in open contradiction to the findings about the growing inequalities in access to WSS caused by these policies during the last few decades, which are directly related to the failure in meeting the MDGs, as recent official reports suggest,

[I]t is usually the poor and otherwise excluded and marginalized populations who tend to have least access to improved drinking water supplies and sanitation. **Interventions that do not have an equity focus may exacerbate inequality by failing to reach the most disadvantaged subgroups.** Closing these gaps requires explicit consideration of those who are being left behind. [...] there are multiple dimensions of inequality, which can overlap, combine or reinforce one another. Without specific attention to marginalized or vulnerable groups, **it is possible to see national averages improve while within-country inequality increases** (WHO-UNICEF, 2014: 38; our emphasis).

The position of the CAF is by no means exceptional, and rather illustrates the prevailing policy option of a wide range of governments of the leading world countries, as also illustrated by the ongoing debates about the Trade in Services Agreement (TISA) currently negotiated by 23 members of the World Trade Organization (WTO), including the European Commission. The policies of mercantilization and privatization of essential public services, including WSS, that are at the heart of these initiatives, place these countries at odds with the bold and universalistic commitments recently agreed for the 2030 SDG development agenda. The commodification of WSS, whether through outright privatization or by other means, including the transformation of the remit of public utilities from providers of universally available WSS into profit-seeking enterprises not dissimilar from private businesses, will clearly be **a major threat and obstacle for the goal of making essential WSS universally available to all**. Also, another major obstacle facing the achievement of the SDGs will be the **weakening and dismantling of public sector capacity to regulate and deliver essential services**, including WSS, resulting from the policies of deregulation, liberalization, and overall **reduction of the State’s responsibility for the provision of these services** that have been implemented worldwide during the last three decades and continue to be the prevailing policy preference of the governments of the leading world countries and the IFIs.

## **2. Policy implications and recommendations**

Against this background, the lessons learned from DESAFIO’s study on socio-technical innovations that were implemented since the 1980s to tackle the deficit in WSS affecting vulnerable communities have a range of implications for policy design and implementation. We summarize these below, and include recommendations that may be helpful to support policy design and implementation with the aim of fulfilling the UN’s “historic decision on a comprehensive, far-reaching and people-centred set of universal and transformative Goals and targets”, the SDGs (UN, 2015b: 3).

- The main causes explaining the failure of many countries to meet the MDGs in 2015 were neither environmental constraints nor the shortage of scientific and technical knowledge or the unavailability of technological solutions. The key challenges, risks, and uncertainties facing the international community in relation to the SDGs are mainly related to socio-economic, political, and policy-institutional processes.
- The evidence shows that a crucial reason for failure in meeting the MDGs related to deficiencies in the process of democratisation of the politics and management of essential WSS.
- The extension of safe essential WSS to cover the unserved population must rely on heavy state involvement, and particularly on heavy public funding. It is not possible to rely on private funding to extend basic services to the poor and very poor. The provision of essential WSS cannot be organised as a profit making activity, whether by private or public organisations.
- The State must provide strong and continued support to make socio-technical innovations to democratize WSS possible, and more importantly, sustainable and replicable.
- It is unfair and undemocratic to transfer the responsibility for funding and running essential WSS to the poor and very poor, as it is a primary responsibility of the State to guarantee universal access to these services. There must be a balance between the promotion of autonomy and substantive citizenship in vulnerable communities and the exercise of State responsibility for guaranteeing the provision of essential services.
- Prevailing public policies in WSS continue to alienate and exclude common citizens and users rather than promote democratic practices.
- The evidence shows that too often “citizen participation” in policy programmes means “willingness” to accept decisions already taken by power holders and technical experts with little or no consultation.
- Users are often reduced to the roles of passive beneficiaries, providers of labour and resources, or mere clients of profit-oriented WSS. However, substantive decisions, for instance about how WSS should be financed and organised (e.g. should these be provided as a public good and a social right or should rather be considered to be commodities to be delivered commercially by profit-oriented private or public operators?) are imposed on the population, often with disregard for the fact that large citizen majorities oppose the initiatives, which has triggered endless conflicts in many countries.
- These prevailing policies have created an imbalance resulting in the weakening of local governments and civil society. In many cases the authorities have lost the capacities they had acquired in the past to exercise democratic control and regulation over the management of essential public services such as WSS.
- The fact that responsibility for WSS and closely related activities such as management of water resources or environmental and public health is often fragmented across different sectors and levels of decision-making hampers design and implementation of effective policies.

- The production of scientific knowledge in this field continues to be characterised by high fragmentation between the natural, technical, and social sciences, which remains a significant factor affecting the pace of progress in tackling the challenges.

## **2.1 Recommendations**

1. Achieving the universalization of access to essential WSS as envisaged in SDG 6 is an inclusive political project, which by definition cannot be achieved through exclusionary politics, such as the commodification of water and water services. It will require long-term planning, not just to build the infrastructures and extend coverage, but also to make the systems sustainable over time and the services available to all independently of the capacity to pay individuals and families. The public policies required to achieve the universalisation of essential WSS must be grounded on the principle of equality, and must subordinate economic efficiency and private profit to the higher goals of democratic wealth distribution and civilised wellbeing.
2. Governments and international institutions should stop promoting policies that privilege private profit over public benefits, such as the privatisation and mercantilisation of WSS in their different forms. Countries should put in place legal and policy mechanisms to prevent the commodification of water resources and WSS. If countries continue to allow the control of water resources and WSS by private companies and wealthy individuals, SDG 6 will be no more than a romantic idea never put into practice.
3. Successfully tackling the challenges facing the SDGs requires radical socio-technical solutions. In particular requires breaking with the prevailing status quo dominated by technology-centred, top-down, often paternalistic and even authoritarian solutions in the provision of WSS that tend to privilege short-term interests over the common good.
4. Public policies related to essential public services must be oriented at strengthening the capacities of public authorities to deliver and regulate the provision of safe quality services. Governments and international institutions must invest heavily in the provision and long-term maintenance of the required infrastructure and management operations. These investments must privilege broad and long-term social “returns” (in public health, quality of life, etc.) over short-term economic gains. The revitalisation of the Global Partnership for Sustainable Development envisaged in SDG 17 must radically change the prevailing emphasis on public-private partnerships, that often has served to promote privatization and mercantilization, and strongly support the development of public-public, public-community, and community-community partnerships to achieve SDG 6.
5. Meeting SDG 6 will also require tackling the world’s water crisis, particularly the pollution of water bodies and the human-driven processes of desertification and desiccation. These are enormous tasks that many governments in the developing world will find extremely difficult owing to

- financial restrictions, lack of human resources, etc. There is a strong need for international co-responsibility in this matter.
6. Substantive democratisation in the government, management and access to essential public services such as WSS requires social participation and control over the decision-making process by common citizens and users. This includes the scrutiny and democratic control of decisions about how water and essential services such as WSS are governed, managed, and distributed, by whom, for whose benefit, etc. This is seldom available to local communities and common citizens, even in the core Western countries with consolidated electoral democracies. Water politics and management are seldom transparent to citizens, are largely unaccountable, and tend to be openly authoritarian and top-down. There are currently no effective mechanisms to enable common citizens to exercise democratic control over these activities. Achieving substantive democratization in the WSS sector will require putting in place effective legal and administrative mechanisms to allow the meaningful involvement of citizen-users and make the activities of government and management of WSS subject to citizen scrutiny and control.
  7. It also requires going beyond the dominant situation whereby international organisations and donors pay lip service to socio-technical innovations but in practice continue to favour the reproduction of a status quo that privileges the interests of private corporations and profit makers over the needs of the poor and very poor.
  8. There is a need to make policy and technology subservient to the higher goals of achieving efficacy and effectiveness, not just efficiency, in the delivery of WSS if we are going to meet the SDG 6 target of full universalisation of WSS and other essential services.
  9. One of the key elements to achieve success in tackling the challenges facing the SDGs lies in developing higher levels of understanding of
    - a. the conditions, factors and processes that facilitate the emergence of socio-technical innovations to solve the crisis of WSS affecting vulnerable communities;
    - b. the critical requirements to make successful socio-technical innovations sustainable and replicable;
    - c. the obstacles to their sustainability and replication.DESAFIO has extracted helpful lessons about these three aspects, the most relevant of which are summarized in the reports that complement these guidelines (Castro, 2015b,c).
  10. The causes of failure to universalise the access to safe WSS are multidimensional, involving natural, social, and individual processes and factors that require systemic solutions drawing on interdisciplinary expertise and inter-sector collaboration in policymaking and implementation. Meeting the SDGs will require strong support from governments and international organisations to develop innovative socio-technical solutions for WSS that foster:
    - a. inter-sectoral cooperation in the management of basic WSS;

- b. inter- and transdisciplinary coordination for the production of knowledge and the implementation of research results
  - c. ensuring that policy design and implementation are grounded on the principles of social equality, and substantive democracy. On the latter point, Governments and international organisations should support the development of innovative socio-technical interventions that promote the active and meaningful, not merely tokenistic, involvement of local communities and other relevant actors.
11. There is a need to promote and invest in further research to identify the existing barriers and opportunities for enhancing the access to water technologies, especially for those sectors of the population who are the main targets of the SDGs, the poor and the most vulnerable sectors, in particular women and children. These actors must be involved in all stages of the research process, from the inception through the design, implementation, monitoring, and validation.

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## **Original report cover – Article 3**



### **Recommendations for Future Research**

**Work Package 6 Report**  
**(Deliverable 6.3)**

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With the support of the consortium partners



Newcastle upon Tyne, 31 July 2015

DESAFIO is a Collaborative Project (CP-FP-SICA) funded by the European Union's  
Seventh Framework Cooperation Programme. Grant Agreement Nº 320303.



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## **Article 3**

### **Recommendations for Future Research**

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#### **1. Research gaps and needs**

This brief report presents suggestions for future research that emerged from our analysis of existing research gaps and needs identified in our project. In principle, given the topic of our project, these research gaps and needs concern the situation of essential water and sanitation services (WSS) in Latin America and the Caribbean (LA&C). However, we believe that the suggestions for further research are also relevant for other forms and causes of inequality, injustice and vulnerability beyond the specific case of WSS. Likewise, the suggestions are surely applicable to other countries and regions.

The suggestions are the result of our reflection on the experiences that were the focus of DESAFIO's case studies. These covered cases of extreme inequality and vulnerability observed in the metropolitan areas of Recife (Castro and Ferreira, 2015a,b) and Rio de Janeiro (Britto et. al., 2015) in Brazil. Also, we addressed the huge inequalities and vulnerabilities affecting rural areas such as the case of the Quilombola communities (de Pádua et al., 2015) and the rural communities in Ceara (Freitas et. al., 2015; Brown, 2015; Passos, et. al., 2015), Brazil, and in the Cauca Valley of Colombia (Peña et. al., 2015a,b). The research also looked at inequalities and vulnerabilities affecting populations that in principle enjoy better living conditions but that also suffer from poor and even high-risk water quality, and in the case of the province of Santa Fe, Argentina (Portapila et. al., 2015). Most suggestions for further research below are directly connected to the specific topic of the deficit of WSS in vulnerable communities.

More generally, our research was also an effort to put in practice the principles of inter and trans-disciplinarity. From our experience, we believe that there is a need to provide stronger support for research adopting this approach.

Funding for research in the area of essential infrastructure services tends to be heavily biased in favour of techno-scientific disciplines, and there is a need to re-balance this situation, providing more support for research that aims to bring together techno-scientific and social disciplines. Our project provided substantial evidence of the failure of technocentric approaches to solve the problem of poor communities, a fact recognized openly by techno-scientific experts.

In order to enhance the chances of producing better results in the ground, there is a need to support research efforts that aim to transcend the basic forms of interdisciplinarity that proliferate and are limited to the instrumental borrowing of

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<sup>1</sup> This article includes contributions from some of the project partners.

concepts and tools between different disciplines without attempting to produce new, higher level, synthesis of knowledge. There are a few examples of successful high-level interdisciplinary research in the field of essential public services, and this should be seen as an opportunity to create new programmes, adequately funded, to strengthen this area of knowledge.

Interdisciplinarity in this field must be necessarily integrated with transdisciplinarity, understood as the recognition that the production of knowledge is not a preserve of scientific institutions, individuals, and groups. DESAFIO responded to an EU call that precisely required the incorporation of non-academic actors, particularly vulnerable communities, in the research process, and this was partly achieved in some cases. This was also very rewarding. However, we confirmed that there still exist enormous epistemological, cultural, and institutional obstacles to carry out this kind of research. Scientific institutions, individuals, and groups, even those committed to make contributions to tackle inequality and injustice and promote democratization, often find very hard to accept the principles of inter and transdisciplinarity, and therefore find it also very difficult to practice it. Therefore, much more effort is needed to provide opportunities to further inter- and transdisciplinary research, allocating adequate levels of funding for it, and contributing to a much needed process of institutional and cultural change within scientific institutions. The EU has taken the lead in this area in the past, and is in an excellent position to strengthen these initiatives.

## **1.1. Production and reproduction of inequality and injustice**

The mechanisms and processes that account for the **production and reproduction of inequalities** in the water and sanitation sector. Inequalities in the distribution of, access to and the management of the services. Inequalities between and within different areas (municipalities, centre-periphery of metropolitan regions, rural-urban regions, etc.). The particular **power structures** that help to produce these inequalities. **Reconstruction of the historical processes** that account for these inequalities. Reflecting on the experiences that were the focus of DESAFIO's case studies, we developed some preliminary questions that may be the object of future research:

What **policy decisions** were taken in the past that help to explain current inequalities? Who took those decisions? How were these decisions taken? When? There were moments in the past that offered opportunities to reverse the conditions of inequality? What factors and processes help to explain how those opportunities emerge? Why these opportunities were not seized? What was the role of governments (local, regional, national) over time in relation to the **perpetuation of these inequalities**? What other actors played a role in the process?

## **1.2. Socio-political conflicts related to water and sanitation services**

Structural inequality and injustice in relation to WSS have been and remain a major cause of **social and political conflicts**. Although these conflicts have been the object of a wealth of research in LA&C and elsewhere, we believe that there is a need to update our

knowledge about these conflicts for a number of reasons. Firstly, the factors and processes underpinning inequality, injustice, and vulnerability are part of complex, **multidimensional socio-political configurations** that evolve over time, often unpredictably. Secondly, there is a need to enhance our knowledge of these processes to overcome **prevailing reductionisms** that at best explain these conflicts as malfunctions of the political system and at worst dismiss these processes as intractable or as uninteresting for the formulation of public policies in the field of essential public services.

### **1.3. Social mobilization and participation**

Our research confirmed a well-established fact: processes of social mobilization and participation tend to **weaken, fade and disappear over time**. This is due to a wide range of factors, from the disappearance of the incentives that originally triggered the mobilization (e.g. the achievement of the original objectives of the mobilization), loss of interest, wear and attrition of the actors (including loss of memory of the recent past), depoliticisation, co-optation, to repression resulting in the disbanding of the participants. We found strong evidence of these processes in several of our case studies, notably in the cities of Recife and Rio de Janeiro in Brazil, and in the rural cases of Ceara, Brazil, and Cauca Valley in Colombia. Among other issues, we identified the weakening of social movements that used to be well organized and active in the defence of their right to dignified living conditions, to the point that they became virtually silent despite the fact that they are still suffering the consequence of extreme inequality and injustice in relation to WSS and other essential services. In some cases, where the long-term sustainability of the socio-technical innovations studied (e.g. the SISAR system of rural sanitation in Brazil or the community-managed rural WSS in Colombia) relies very strongly on the commitment and participation of the local communities, this is a **major obstacle for the implementation of public policies** and in the extreme a matter of survival for the innovations themselves.

We believe that this is a fertile ground for future research, taking into account that most policies being promoted by governments to tackle the deficit of WSS in vulnerable communities are **highly dependent on community engagement and participation**. There is a need to enhance our understanding of these processes and find mechanisms to promote meaningful, not merely tokenistic forms of citizen engagement.

More specifically, in relation to particular cases such as the SISAR system of rural sanitation implemented in Brazil, we believe that there is a need to develop further research on several issues, taking into account that **the system is being promoted for replication across Brazil and in other countries of LA&C and Africa**. What is the character and extension of the **demobilization** of communities? Is it general across all SISAR units, or is it localized? Are there different degrees and forms of demobilization in the different units? How could we explain these differences? Is the process of demobilization related to the fact that relying on community participation to run essential WSS may be **unviable in the long-term and therefore unsustainable**? Could it be that the requirements of the SISAR model, as laid by the institutions of international cooperation that promote it, based on **co-management** of the systems is unfeasible in the local conditions of the Brazilian semi-arid region? What mechanisms could be developed

to avoid the demobilization of the communities and to main their effective, long-term participation in running the systems? If co-management is not viable in the long term, what other options could be developed? How could the initial willingness to participate and commitment that characterizes the establishment of individual SISAR units be seized to stimulate process of social change that can foster the democratization process? What pedagogical, political, and cultural mechanisms could be effectively developed to help the communities to achieve these goals?

#### 1.4. Public policy, urban and rural sanitation

Our research suggests that there is a need to **examine public policy in historical and comparative perspective**, to better understand the processes that underpin the production and reproduction of inequality, injustice, and vulnerability. The prevailing trend in public policy studies tends to centre on the present with little attention paid to long-term patterns that may help to explain the resistance to policy change that can be identified in relation to the chronic deficit in WSS affecting vulnerable communities.

An important area of future research concerns the need to examine the **practical consequences and effects of the decentralization policies implemented since the 1980s in the WSS sector**. In particular, there is little knowledge about the impact of these policies on small municipalities and rural areas, as official data tend to be provided in aggregate form including large cities, which obscures the particular situation affecting small communities.

In some of our case studies, such as the informal, community-managed springs in Rio de Janeiro (Britto et. al., 2015) that have provided water to a large number of people for decades, the evidence shows that **the authorities completely ignore their existence**, despite the fact that on health and sanitary grounds these community-led systems can be problematic. We believe that there is a need for in-depth **research to map and characterize these systems**, evaluate the **quality of the water being consumed**, and put in place the mechanisms to ensure that this water meets the standards required for sanitary safety. We identified a number of such mechanisms that would be relatively inexpensive to implement, such as regular water tests and public local display of the results available to the users.

In the case studies involving rural WSS in Brazil and Colombia, it became clear that there is a **deficit of public policies and programmes to promote the universalization of these services in rural areas**. Where there are specific programmes for rural sanitation, these tend to remain localized, reduced to isolated efforts, and there seem to be major obstacles to transform these into national policies that could provide the necessary framework to achieve universalization. We believe that, in addition to the continuous search for effective solutions at the local level, there is a need for research focused on the factors and processes that may explain the **protracted neglect of rural areas in national public policies** for the WSS sector, what obstacles continue to delay the formulation of long-term State policies for rural WSS.

Our research in Colombia casts light on a situation that affects LA&C as a whole: there is scant and imprecise information about the situation in rural and peri-urban areas. Governments **do not know exactly how many WSS systems are run by community**

**organizations** in rural and peri-urban areas. In the Cauca Valley of Colombia alone, the site of two of DESAFIO's case studies, it is estimated that there may be **thousands** of such organizations, but there is no precise information. Most of these systems operate without support and in the absence of water quality control. This situation suggests that LA&C countries would benefit from the creation of an **Observatory of Rural Water and Sanitation services in each country**. This initiative could serve to map the regional situation in rural areas, ascertaining the situation and quality of the services, existing and emerging conflicts, and provide tools for policy design and implementation with participation of the communities, and local, regional and national governments.

In the case of the SISAR system implemented in Brazil, there is scope for **comparative public-policy analysis** looking at how the different SISAR units behave in a number of areas. This is important because the SISAR system is now promoted across Brazil, LA&C and Africa, with the potential to be exported to other areas too. We believe that there is a need to enhance our knowledge about several issues. For example,

- given that SISAR units are implemented in **widely diverging contexts subject to different social, cultural, socio-ecological conditions**,
  - how do these systems operate in these different contexts?
  - What is the impact of context on the functioning of the systems?
  - What are the communication and community engagement strategies used by SISAR in different contexts?
  - What is the impact of the introduction of SISAR on a community? This offers room for longitudinal and comparative studies between different communities over time.
  - How do pre-existing and long-term traditions of cooperation, reciprocity and associativism interact with the implementation and function of the systems? This offers room for comparative, participative studies of different communities, to ascertain their degree of involvement and engagement in the co-management of the system, their disposition to co-manage the systems in the long-term, etc. Also, it offers possibilities for comparative studies on different traditions of reciprocity and cooperation, their impact on policy implementation, how they evolve, adapt or react to the new systems, etc.
- More detailed comparative analyses would help to ascertain with more precision the **opportunities and obstacles facing the replication of the system** in other contexts.
- Also, more research is needed about the **criteria** used by SISAR for the allocation of financial resources derived from international cooperation and other financial sources, the mechanisms being developed for the expanded and upscaled replication of the system with attention balancing speed (given the urgency of the implementation) with safety, particularly water quality.
- Also, more research is needed about the actual **performance of the model in the ground**:
  - SISAR is meant to be based on **co-management** with a strong involvement of the local community associations and to become **financially self-sufficient** over time.

- However, SISAR **relies heavily on State support** for technical advice, management support, support for laboratory tests, maintenance of water meters, and technological modernization more generally.
- Moreover, on the community level several areas of SISAR depend on **flexible work arrangements**, whereby the work is carried out by people **without formal employment** links with SISAR or with the State utility CAGECE.
- In the cases of paid work, the salary of community employees tends to be **lower than the salary paid for similar work** in the State utility.
- This case suggests that it is crucial to carry out **more research on the labour arrangements in place in rural sanitation systems** in LA&C, which tend to be reliant on flexible work, or unpaid voluntary work. We know very little about the impact of these arrangements on the communities themselves and the long-term consequences for the systems. **Are these arrangements viable in the long term to ensure the sustainability of the services?** What are the consequences of these arrangements from the perspective of **the democratization process in the WSS sector?**

More generally, some of the suggestions for further research emerging from our studies on rural systems in Brazil and Colombia can be useful beyond the situation of rural areas. Here we provide a list of such suggestions:

- Studies of changes in the family units and in the communities more generally that result from the implementation of new WSS.
  - Studies carried out before and after the implementation to ascertain its impact on gender relations and on age groups within households and whole communities. What changes (if any) can be identified by the provision of in-house water supply, which will release the burden of carrying water from women and children or other household members? Does the introduction of in-house water provision change household dynamics?
  - Qualitative studies about changes in user perceptions in relation to water and the environment that result from the introduction of in-house water supply. Does it change people's perceptions of the risks posed by raw water? What is their perception of the chemical products used to treat drinking water? Are there any changes in their perception of health and hygiene issues?
  - What is the impact of the availability of intra-household water and sanitation infrastructure and amenities (water tanks, showers, taps, etc.) in the conditions affecting the access to water, especially regarding per capita water consumption, intermittencies, etc.
  - What are the cultural aspects that surround the continued practice of open defecation by people who gained access to households with sanitary facilities? What is the risk to community health and environment of the continued practice of open defecation?



- What socio-economic and cultural aspects influence the rejection by individuals and families to the installation of in-house sanitary facilities? What rank of priorities people have in relation to the improvement of these facilities?
- Evaluation of the impact of implementing a differential tariff system for users who are recipients of State income benefits to ascertain a) the impact of differential tariffs on people's income and b) the impacts of the tariffs on the system's revenue.
- Evaluations of the difference between per capita expenditure in water before and after the implementation of the systems. Analysis of the results in relation to the per capita costs of the amortization of the investment required to build the system.

### **1.5. Socio-ecological aspects**

Our research in general, with exception of the two Colombian cases, could not cover in depth the socio-ecological dimension of the deficit in WSS affecting vulnerable communities. There are several issues arising for further research.

We believe that there is scope for studies on perception and valuation of ecosystemic services by the different actors involved. These should be ideally holistic studies that integrate the diversity of positions and use the concept of ecosystemic services to articulate issues such as the regulation of water flows with the provision of WSS. These studies can provide useful materials for policy design and implementation with the objective of ensuring long-term water availability for the communities and sustainability of the ecosystems.

### **1.6. Socio-technical innovations**

- There is a need to maintain a healthy scepticism about the type of technology that is used to tackle the deficit of WSS affecting vulnerable communities. We need to carry out studies about the requirements of these technologies and their impact in specific situations, in order to be able to practice the participative selection of technologies jointly with the user communities. Participative selection and later participative management are crucial for the long-term sustainability of the innovations, but these are seldom practiced.
- Further research on the concept of socio-technical innovation, transcending the prevailing reduction of “innovation” to the field of technology development. More research is needed that looks at the dynamic interaction between humans and technology paying attention at the role played by meaning, symbolism, and sense of achievement in the social design and appropriation of innovations to tackle inequality and injustice in the WSS sector.

## **1.7. The politics of essential WSS**

Although there is a wealth of research, particularly in the field of political ecology, about the politics of essential public services such as WSS, there is much needed to develop further research on the topic.

- Despite much research demonstrating the negative impact of prevailing policies such as de-regulation, neoliberal decentralization, privatization, and mercantilization of public utilities, these policies remain mainstream worldwide and are promoted by the IFIs, donors, aid agencies, and governments. The negative impacts affect particularly the poorest sectors of the population, which are also those normally lacking access to essential WSS.
- Owing to widespread conflicts caused by these policies during the 1990s, and owing to the failure of these policies to deliver the promised benefits for the poor, there has been a change in tactics leading to a wide range of policies trying to achieve the same ends with different means, which include the transformation of public companies so that they are required to operate like private businesses. This is happening worldwide, but has a particular impact in LA&C, and the countries under study in DESAFIO are at the centre of the process, together with Chile and Mexico. There is a need for more research about the impact of these policies on poor, vulnerable communities.
- There is also considerable evidence and a high level of agreement, even among promoters of neoliberal WSS policies, that the universalization of access can only be achieved through heavy State involvement, including heavy investment. Therefore, more research should be directed at supporting the improvement of public services, strengthening local governments and public utilities to deliver high quality services. In urban and peri-urban areas, more research should be funded on the development of high quality cooperation between local authorities, public utilities, and communities, strengthening public-public, public-community, and community-community partnerships for the provision of essential services, including WSS. There is scant research on these issues, largely because there is very little funding available to support these initiatives.

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DESAFIO received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 320303. The information contained in this Working Paper reflects only the author's views and the European Union is not liable for any use that may be made of the information contained therein.